

RED SEAL

www.red-seal.ca
www.sceau-rouge.ca

National Occupational Analysis

2007

Agricultural Equipment
Technician

Human Resources and
Social Development Canada

Ressources humaines et
Développement social Canada

Canada
LM-520-11-07E

Agricultural Equipment Technician

2007

Trades and Apprenticeship Division

Workplace Partnerships Directorate

National Occupational Classification:

Disponible en français sous le titre :

Division des métiers et de l'apprentissage

Direction des partenariats en milieu de
travail

7312

Mécanicien/mécanicienne de machinerie
agricole

©Her Majesty the Queen in Right of Canada, 2007
Cat. No.: HS42-1/14-2007E
ISBN 978-0-662-46663-5

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this National Occupational Analysis as the national standard for the occupation of Agricultural Equipment Technician.

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources and Social Development Canada (HRSDC) sponsors a program, under the guidance of the CCDA, to develop a series of national occupational analyses.

The National Occupational Analyses have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility of apprentices and skilled workers in Canada; and,
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

ACKNOWLEDGEMENTS

The CCDA and HRSDC wish to express sincere appreciation for the contribution of the many industrial establishments, professional associations, labour organizations, tradespersons, provincial and territorial government departments and agencies, and all others who contributed to this publication.

Special acknowledgement is extended to the following representatives from the trade.

Eric Deziel	Ontario
Markus Flueckiger	British Columbia
Tim McKay	Saskatchewan
Justin Meena	Saskatchewan
Brooke Rossnagel	Manitoba
Morgan Salsman	Nova Scotia
Joseph Weston	New Brunswick
Shawn Zorn	Alberta

This analysis was prepared by the Human Resources Partnerships Directorate of HRSDC. The coordinating, facilitating and processing of this analysis were undertaken by employees of the National Occupational Analysis (NOA) development team of the Trades and Apprenticeship Division. Karen Frennette, for the host jurisdiction of Saskatchewan, also participated in the development of this NOA.

TABLE OF CONTENTS

FOREWORD	I
ACKNOWLEDGEMENTS	II
LIST OF PUBLISHED NATIONAL OCCUPATIONAL ANALYSES	V
STRUCTURE OF ANALYSIS	VII
DEVELOPMENT AND VALIDATION OF ANALYSIS	VIII

ANALYSIS

SAFETY	3
SCOPE OF THE AGRICULTURAL EQUIPMENT TECHNICIAN TRADE	4
OCCUPATIONAL OBSERVATIONS	6

BLOCK A OCCUPATIONAL SKILLS

Task 1	Handles tools and equipment.	7
Task 2	Organizes work.	11
Task 3	Performs routine trade activities.	13

BLOCK B ENGINES AND ENGINE SUPPORT SYSTEMS

Task 4	Performs engine diagnostics.	19
Task 5	Repairs engine and engine support systems.	24

BLOCK C DRIVE TRAIN

Task 6	Diagnoses drive train.	28
Task 7	Repairs drive train.	30

BLOCK D HYDRAULIC, HYDROSTATIC AND PNEUMATIC SYSTEMS

Task 8	Diagnoses hydraulic, hydrostatic and pneumatic systems.	33
Task 9	Repairs hydraulic, hydrostatic and pneumatic systems.	35

BLOCK E ELECTRICAL AND ELECTRONIC SYSTEMS

Task 10	Diagnoses electrical power and control/monitoring systems.	38
Task 11	Repairs electrical power and control/monitoring systems.	40

BLOCK F	STEERING, SUSPENSION AND BRAKES	
Task 12	Diagnoses steering and brake systems.	42
Task 13	Repairs steering and brake systems.	44
Task 14	Diagnoses suspension components.	45
Task 15	Repairs suspension components.	47
BLOCK G	STRUCTURAL COMPONENTS AND OPERATOR STATION	
Task 16	Diagnoses structural components.	49
Task 17	Repairs structural components.	51
Task 18	Diagnoses climate control systems.	52
Task 19	Repairs climate control systems.	54
BLOCK H	AGRICULTURAL EQUIPMENT	
Task 20	Prepares agricultural equipment.	56
Task 21	Diagnoses land preparation tools, tillage implements and seeding/planting implements.	58
Task 22	Adjusts land preparation tools, tillage implements and seeding/planting implements.	60
Task 23	Repairs land preparation tools, tillage implements and seeding/planting implements.	62
Task 24	Diagnoses harvesting, forage and hay equipment.	63
Task 25	Adjusts harvesting, forage and hay equipment.	66
Task 26	Repairs harvesting, forage and hay equipment.	68
Task 27	Diagnoses application and irrigation equipment.	70
Task 28	Adjusts application and irrigation equipment.	72
Task 29	Repairs application and irrigation equipment.	74

APPENDICES

APPENDIX A	TOOLS AND EQUIPMENT	79
APPENDIX B	GLOSSARY	83
APPENDIX C	ACRONYMS	85
APPENDIX D	BLOCK AND TASK WEIGHTING	87
APPENDIX E	PIE CHART	93
APPENDIX F	TASK PROFILE CHART	95

**LIST OF PUBLISHED
NATIONAL OCCUPATIONAL ANALYSES
(Red Seal Trades)**

TITLE	NOC* Code
Agricultural Equipment Technician (2007)	7312
Appliance Service Technician (2005)	7332
Automotive Painter (2005)	7322
Automotive Service Technician (2005)	7321
Baker (2006)	6252
Boilermaker (2003)	7262
Bricklayer (2007)	7281
Cabinetmaker (2007)	7272
Carpenter (2005)	7271
Concrete Finisher (2006)	7282
Construction Electrician (2003)	7241
Cook (2003)	6242
Electrical Rewind Mechanic (1999)	7333
Electronics Technician – Consumer Products (1997)	2242
Floorcovering Installer (2005)	7295
Glazier (2004)	7292
Hairstylist (2005)	6271
Heavy Duty Equipment Technician (2004)	7312
Industrial Electrician (2003)	7242
Industrial Mechanic (Millwright) (2007)	2243
Instrumentation and Control Technician (2007)	7311
Insulator (Heat and Frost) (2007)	7293
Ironworker (Generalist) (2006)	7264
Ironworker (Reinforcing) (2006)	7264
Ironworker (Structural/Ornamental) (2006)	7264
Lather (Interior Systems Mechanic) (2007)	7284

* National Occupational Classification

TITLE	NOC* Code
Machinist (2005)	7231
Metal Fabricator (Fitter) (2003)	7263
Mobile Crane Operator (2006)	7371
Motorcycle Mechanic (2006)	7334
Motor Vehicle Body Repairer (Metal and Paint) (2005)	7322
Oil Burner Mechanic (2006)	7331
Painter and Decorator (2007)	7294
Partsperson (2005)	1472
Plumber (2003)	7251
Powerline Technician (2004)	7244
Recreation Vehicle Service Technician (2006)	7383
Refrigeration and Air Conditioning Mechanic (2004)	7313
Roofer (2006)	7291
Sheet Metal Worker (2006)	7261
Sprinkler System Installer (2003)	7252
Steamfitter — Pipefitter (2007)	7252
Tilesetter (2004)	7283
Tool and Die Maker (2005)	7232
Transport Trailer Technician (2003)	7321
Truck and Transport Mechanic (2007)	7321
Welder (2004)	7265

Requests for these National Occupational Analyses may be forwarded to:

Trades and Apprenticeship Division
Workplace Partnerships Directorate
Human Resources and Social Development Canada
140 Promenade du Portage, Phase IV, 5th Floor
Gatineau, Quebec K1A 0J9

These publications are also available to order or download online at: www.red-seal.ca. Links to Essential Skills Profiles for some of these trades are also available on this website.

STRUCTURE OF ANALYSIS

To facilitate understanding of the nature of the occupation, the work performed is divided into the following categories:

Block	the largest division within the analysis which reflects a distinct set of operations relevant to the occupation.
Task	the distinct activity that, combined with others, makes up the logical and necessary steps the worker is required to perform in a block.
Sub-task	the smallest division of work activities that, combined together, fully describe all duties of a task.
Supporting Knowledge and Abilities	the elements of skill and knowledge that an individual must acquire to adequately perform a sub-task.

Information on the following areas of this occupation is also provided throughout the analysis:

Trends	any shifts or changes in technology that affect the block.
Context	statements written to clarify the intent and meaning of tasks.
Related Components	all components related to a specified task being undertaken.
Tools and Equipment	types of tools and equipment necessary to perform the work on all given tasks identified within the block. More detailed lists of these types are shown in Appendix A.

The appendices located at the end of the analysis are described as follows:

Appendix A — Tools and Equipment	a non-exhaustive list of tools and equipment used by a journey person throughout this trade.
Appendix B — Glossary	definitions or explanations for terms referred to in this analysis.
Appendix C — Acronyms	a list of acronyms used in this analysis with their full name.
Appendix D — Block and Task Weighting	the block and task percentages as submitted by each jurisdiction at the validation stage and the national averages of these percentages.
Appendix E — Pie Chart	a graph which depicts the national percentages assigned to blocks.
Appendix F — Task Profile Chart	a chart which outlines graphically the blocks, tasks, and sub-tasks of this analysis.

Development of Analysis

A draft analysis is developed by a committee of industry experts in the field led by a team of facilitators from HRSDC. This draft analysis breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

The NOA development team then forwards a copy of the analysis and its translation to provincial/territorial authorities for a review of its content and structure. Their recommendations are assessed and incorporated into the analysis.

Validation and Weighting Method

This copy of the analysis is sent to all provinces/territories for validation/weighting. Each jurisdiction validates the document with the use of a provincial/territorial occupational advisory committee. They examine the blocks, tasks and sub-tasks of the analysis:

- | | |
|------------------|--|
| BLOCKS | Each committee assigns percentages to blocks based on the number of questions that they would assign for each block on a hundred question examination of the entire trade. |
| TASKS | Each committee assigns percentages to tasks based on the number of questions that would be assigned to each task on a hundred question examination for its block. |
| SUB-TASKS | Sub-tasks are examined by each committee and they indicate with a YES or NO whether or not the sub-tasks are performed by the skilled workers within the occupation in their jurisdiction. |

The results of this exercise are submitted to the NOA development team who then analyzes the data and incorporates it into the document. The analysis provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for block and task weighting provide guidelines for the development of the Interprovincial Red Seal Examination for the trade.

This method for the validation of the National Occupational Analysis also identifies common core sub-tasks across Canada for a specific occupation. The criteria for determining common core depend on the performance of sub-tasks. If at least 70% of the responding jurisdictions perform a sub-task, it shall be considered common core. Interprovincial Red Seal Examinations are based on the common core identified through this validation process.

Definitions for Validation and Weighting

YES	sub-task is performed by workers in the occupation in a specific jurisdiction.
NO	sub-task is not performed by workers in the occupation in a specific jurisdiction.
NV	<u>N</u> ot <u>V</u> alidated by a province/territory.
ND	<u>N</u> ot <u>D</u> esignated in a province/territory.
NOT COMMON CORE (NCC)	sub-task, task or block is performed by less than 70% of responding jurisdictions; these are not to appear on the Interprovincial Red Seal Examination for this trade.
BLOCK %	the average percentage of questions that will be placed on an Interprovincial Red Seal Examination to assess each block of the analysis.
TASK %	the average percentage of questions that will be placed on an Interprovincial Red Seal Examination to assess each task of the analysis.

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

ANALYSIS

Safe working procedures and conditions, accident prevention, and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and work environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that safety-conscious attitudes and work practices contribute to a healthy, safe and accident-free work environment.

It is imperative to apply and be familiar with the Occupational Health and Safety Acts (OH&S) and Workplace Hazardous Materials Information System (WHMIS) Regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

As safety education is an integral part of training in all jurisdictions, personal safety practices are not recorded in this document. However, the technical safety aspects relating to each task and sub-task are included throughout this analysis.

SCOPE OF THE AGRICULTURAL ÉQUIPMENT TECHNICIAN TRADE

“Agricultural Equipment Technician” is this trade’s official Red Seal occupational title approved by the CCDA. This analysis covers tasks performed by an agricultural equipment technician whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Agricultural Equipment Technician		✓	✓			✓	✓		✓				
Agricultural Machinery Technician								✓					
Farm Equipment Mechanic	✓									✓			
Farm Equipment Service Technician				✓									

Agricultural equipment technicians set up, maintain, service, diagnose, repair and recondition agricultural equipment. This equipment includes tractors and combines, as well as a variety of implements for agricultural functions such as tillage, seeding, planting, harvesting, haying, spraying and application. Agricultural equipment technicians may also work on outdoor power equipment. While they are involved in preventative maintenance, agricultural equipment technicians spend most of their time repairing malfunctioning or out of service equipment, either in the shop or in the field.

Agricultural equipment technicians must be able to service and repair gasoline and diesel engines, drive train systems and components, hydraulic, hydrostatic and pneumatic systems, electrical and electronic systems, steering and braking systems, structural components, operator station and other related support systems. They also assemble and adjust new agricultural equipment, perform scheduled maintenance service such as oil changes, lubrication and tune-ups, take defective units apart, and repair or replace broken, worn-out or faulty parts. Agricultural equipment technicians may specialize in certain types of equipment or repairing one particular manufacturer’s product line.

Agricultural equipment technicians must also have good communication and customer service skills, since they often interact with clients. They teach clients how to operate new equipment, discuss equipment operation, and consult with them to pinpoint problems and determine their specific needs.

Agricultural equipment technicians work in the agriculture sector for equipment manufacturers, dealerships and independent repair shops or on large farms. They can also be self-employed. The equipment they work on and the hours tend to change according to the season.

The work often requires considerable standing, climbing, crouching, balancing on equipment and heavy lifting. Technicians must be able to diagnose complex problems and interpret technical manuals and schematics.

Due to the size and complexity of the equipment, safety is of prime importance. Technicians must practice safe operating procedures and be conscious of the impact on people, equipment, work area and environment when performing their work. There is some risk of injury when working with agricultural equipment.

This analysis recognizes similarities or overlaps with the work of automotive service technicians, truck and transport mechanics, heavy duty equipment technicians, small engine mechanics and welders.

With experience, agricultural equipment technicians may act as mentors and trainers to apprentices in the trade. They may also advance to become shop supervisors, service managers, sales people or manufacturers' service representatives. Some may also open their own dealerships or businesses.

OCCUPATIONAL OBSERVATIONS

New technologies such as CAN BUS electronics, constant variable transmissions, computer controls and global positioning systems (GPS) technology require technicians to learn additional skills.

The complexity of the equipment is increased by stringent emission standards. New specialized diagnostic and testing tools such as laptop computers, compression testers, dynamometers and engine analysis units are being used.

Investments by clients on larger, quicker and more sophisticated multi-purpose equipment have increased. There are fewer investments in a number of smaller machines performing one task.

The technician's job is becoming more complex due to an increase in the complexity of equipment and diversification in the agricultural industry. Farming has become more efficient through the use of precision equipment.

Individual dealerships are being purchased by larger organizations, creating multi-location dealerships. Technicians now service larger territories and their responsibilities and tasks have shifted.

Environmental concerns such as soil conservation are on the rise. Eco-friendly equipment and fuel are becoming increasingly available. However, the viability of these options is still limited.

BLOCK A

OCCUPATIONAL SKILLS

Trends

There are more specialized tools, many of which are specific to manufacturers' equipment. Computerized documentation and communication systems have become much more common and have overtaken paper-based resources in recent years. There is more focus on safety and safe work environments.

Related Components

All components apply.

Tools and Equipment

See Appendix A.

Task 1

Handles tools and equipment.

Context

Agricultural equipment technicians must use tools and equipment to perform all tasks in their trade. Handling tools and equipment may include tool usage and maintenance.

Sub-task

1.01

Maintains hand tools.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

1.01.01	knowledge of types of hand tools
1.01.02	knowledge of operating procedures
1.01.03	knowledge of imperial and metric systems
1.01.04	ability to organize and store hand tools
1.01.05	ability to recognize worn, damaged and defective hand tools

Sub-task**1.02** Maintains power tools.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

1.02.01	knowledge of types of power tools such as pneumatic, hydraulic and electrical tools
1.02.02	knowledge of operating procedures
1.02.03	knowledge of basic repairs of power tools
1.02.04	knowledge of original equipment manufacturer (OEM) maintenance specifications such as lubrication and calibration schedules
1.02.05	ability to organize and store power tools
1.02.06	ability to recognize worn, damaged and defective power tools

Sub-task**1.03** Maintains measuring, testing and diagnostic equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

1.03.01	knowledge of measuring devices such as micrometers, calipers and tape measures
1.03.02	knowledge of testing devices such as pressure gauges, flowmeters and temperature gauges
1.03.03	knowledge of diagnostic tools and equipment such as computers, multimeters and handheld diagnostic tools
1.03.04	knowledge of operating procedures
1.03.05	knowledge of OEM maintenance specifications such as calibration schedules
1.03.06	ability to recognize worn, damaged and defective measuring, testing and diagnostic tools
1.03.07	ability to reset measuring, testing and diagnostic tools and equipment
1.03.08	ability to organize and store measuring, testing and diagnostic tools and equipment

Sub-task**1.04****Maintains welding, heating and cutting equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- 1.04.01 knowledge of types of welding/cutting equipment such as oxy-acetylene (OAW) and MIG gas metal arc welding (GMAW)
- 1.04.02 knowledge of welding materials such as electrodes, wires and shielding gases
- 1.04.03 knowledge of jurisdictional regulations for welding procedures
- 1.04.04 ability to organize and store welding/cutting equipment
- 1.04.05 ability to transport welding/cutting equipment according to regulations and standards such as the *Transportation of Dangerous Goods (TDG) Act*
- 1.04.06 ability to recognize worn, damaged and defective welding/cutting equipment and potential hazards

Sub-task**1.05****Maintains personal protective equipment (PPE) and safety equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- 1.05.01 knowledge of types of PPE such as respiratory, hearing, sight and body protection
- 1.05.02 knowledge of types of safety equipment such as caging devices, shop ventilation, eye wash station and first aid kit
- 1.05.03 knowledge of PPE and safety equipment operations
- 1.05.04 knowledge of workplace safety and health regulations such as fall protection and Workplace Hazardous Materials Information System (WHMIS)
- 1.05.05 knowledge of location of safety equipment
- 1.05.06 ability to recognize worksite hazards
- 1.05.07 ability to organize and store PPE and safety equipment
- 1.05.08 ability to recognize worn, damaged and defective PPE and safety equipment

Sub-task**1.06**

Uses staging equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

1.06.01	knowledge of types of staging equipment such as axle stands and blocking
1.06.02	knowledge of load limitations of staging equipment and supporting devices
1.06.03	ability to recognize and interpret tags on staging equipment identifying load limits
1.06.04	ability to recognize worn, damaged and defective staging equipment
1.06.05	ability to organize and store staging equipment
1.06.06	ability to perform maintenance such as lubricating and cleaning

Sub-task**1.07**

Uses hoisting, lifting and securing equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

1.07.01	knowledge of types of hoisting, lifting and securing equipment such as forklifts, jacks, and chain/vehicle hoists
1.07.02	knowledge of operating procedures
1.07.03	knowledge of applications of hoisting, lifting and securing equipment
1.07.04	knowledge of limitations of hoisting, lifting and securing equipment
1.07.05	knowledge of jurisdictional regulations for running equipment
1.07.06	ability to recognize and interpret tags on equipment identifying load limits
1.07.07	ability to recognize safe lifting locations or points
1.07.08	ability to recognize worn, damaged and defective hoisting, lifting and securing equipment
1.07.09	ability to recognize potential hazards such as ceiling heights, overhead wires and uneven surfaces

Sub-task**1.08**

Uses computers for diagnostics and programming.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

1.08.01	knowledge of operation of computerized diagnostic tools and equipment such as laptops and handheld devices
1.08.02	knowledge of components such as data connectors, receptacles and adapters
1.08.03	knowledge of manufacturers' programming procedures
1.08.04	ability to use operating software
1.08.05	ability to use specialized diagnostic software
1.08.06	ability to check for and install equipment software updates
1.08.07	ability to interpret diagnostic results and reports
1.08.08	ability to record diagnostic information
1.08.09	ability to download and print reports from electronic control modules (ECM)

Task 2

Organizes work.

Context

Organizing work includes using documentation, communicating effectively and working within the parameters of shop policies. Agricultural equipment technicians are responsible with the shop foreman or service manager to prioritize and plan their daily tasks.

Sub-task**2.01**

Uses documentation and reference material.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

2.01.01	knowledge of types of documents and reference materials such as service manuals, troubleshooting databases and check lists
---------	--

2.01.02	knowledge of documentation and reference material formats (paper and digital)
2.01.03	knowledge of jurisdictional/industry regulations
2.01.04	knowledge of preventative maintenance schedules
2.01.05	ability to locate vehicle identification numbers and product identification numbers
2.01.06	ability to locate manuals, service bulletins and support documentation (paper and digital)
2.01.07	ability to interpret shop service manuals
2.01.08	ability to interpret schematics and drawings
2.01.09	ability to prepare parts order lists
2.01.10	ability to refer to OEM specifications, and diagnostic and servicing procedures
2.01.11	ability to use computerized reference tools and applications
2.01.12	ability to record technical information such as warranty claims, service records and failure analysis

Sub-task

2.02 Communicates with others.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

2.02.01	knowledge of technical terminology.
2.02.02	knowledge of industry policies and procedures, guidelines and standards
2.02.03	knowledge of verbal and written communication
2.02.04	ability to use communication equipment and media such as Internet, e-mail and fax
2.02.05	ability to translate technical information into common terms
2.02.06	ability to acquire information through questioning
2.02.07	ability to communicate with industry professionals such as partspersons, supervisors and other technicians
2.02.08	ability to communicate with customers
2.02.09	ability to mentor apprentices

Sub-task**2.03**

Plans daily tasks.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

2.03.01	knowledge of time management
2.03.02	knowledge of sequencing of jobs
2.03.03	ability to assign priorities to tasks
2.03.04	ability to estimate repair times and finish dates
2.03.05	ability to plan required materials and tools for diagnostics and repair for service calls
2.03.06	ability to organize travel schedule

Task 3

Performs routine trade activities.

Context

Work practices in this task are common activities which may be performed throughout this trade. Agricultural equipment technicians must adhere to safety procedures and regulations.

Sub-task**3.01**

Maintains safe work environment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

3.01.01	knowledge of WHMIS
3.01.02	knowledge of emergency phone numbers
3.01.03	knowledge of industry-related safety acts and regulations such as the <i>Occupational Health and Safety Act (OH&S)</i>
3.01.04	knowledge of company policies and procedures such as evacuation routes, location of safety equipment and safety training

3.01.05	knowledge of environmental handling, disposal and recycling procedures for materials such as antifreeze, oil and refrigerants
3.01.06	ability to select and use PPE such as safety glasses, boots and coveralls
3.01.07	ability to select and use safety equipment such as fire extinguishing equipment, first aid stations and eye wash stations
3.01.08	ability to recognize potential hazards such as fluids and gases under high pressure in hydraulic, pneumatic and air conditioning systems
3.01.09	ability to handle and store hazardous materials

Sub-task

3.02 Conducts operational tests.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

3.02.01	knowledge of jurisdictional licensing regulations
3.02.02	knowledge of optimal performance of equipment
3.02.03	ability to operate equipment
3.02.04	ability to perform sensory inspections
3.02.05	ability to interpret the results of an operational test

Sub-task

3.03 Maintains fluids, lubricants and coolants.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

3.03.01	knowledge of types of lubricants such as synthetic and non-synthetic
3.03.02	knowledge of the consequences of mixing types of fluids, lubricants and coolants
3.03.03	ability to verify fluid levels such as transmission levels, differential levels and hydraulic levels
3.03.04	ability to select types and grades of fluids and lubricants for the application
3.03.05	ability to identify when fluids have been mixed improperly

3.03.06	ability to take fluid samples
3.03.07	ability to test fluid samples and interpret results such as pH and coolant

Sub-task

3.04 Services filters.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

3.04.01	knowledge of types of filters such as wash-out and pre-cleaners
3.04.02	knowledge of the application of filters such as air, fuel and oil
3.04.03	knowledge of the disposal and recycling of filters
3.04.04	ability to locate filters for components such as transmission, cab and differentials
3.04.05	ability to select and use tools to remove and install filters
3.04.06	ability to relieve pressure from air and fluids before removing filters
3.04.07	ability to remove filters
3.04.08	ability to recognize plugged or damaged filters
3.04.09	ability to install filters

Sub-task

3.05 Maintains hoses, tubing and fittings.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

3.05.01	knowledge of types of hoses, tubing and fittings such as plastic, rubber, neoprene and steel
3.05.02	ability to relieve pressure from air and fluid systems before disconnecting hoses, tubing and fittings
3.05.03	ability to inspect hoses, tubing and fittings
3.05.04	ability to remove and replace hoses, tubing and fittings
3.05.05	ability to match hoses, tubing and fittings to fluid being used

3.05.06	ability to identify pressure limits of hoses, tubing and fittings
3.05.07	ability to construct hose/tube assemblies
3.05.08	ability to flare tubing

Sub-task

3.06 Services bearings/bushings and seals.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

3.06.01	knowledge of types of bearings/bushings
3.06.02	knowledge of types of seals such as static and dynamic
3.06.03	knowledge of the application of bearings/bushings and seals
3.06.04	ability to install wear sleeves
3.06.05	ability to recognize worn, damaged and defective bearings/bushings, seals and shafts
3.06.06	ability to lubricate bearings/bushings and seals
3.06.07	ability to install bearings/bushings and seals
3.06.08	ability to identify the allowable tolerance of bearings/bushings
3.06.09	ability to adjust bearings/bushings

Sub-task

3.07 Uses fasteners, sealing devices, adhesives and gaskets.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

3.07.01	knowledge of types and applications of fasteners such as locking washers, lock nuts and split washers
3.07.02	knowledge of types and applications of sealing devices, adhesives and gaskets
3.07.03	knowledge of torque specification of fasteners
3.07.04	knowledge of taps, dies and thread repair kits

3.07.05	knowledge of anaerobic locking materials and their applications
3.07.06	ability to select the appropriate sealing or gasket material for the job
3.07.07	ability to install fasteners, sealing devices, adhesives and gaskets
3.07.08	ability to identify grade, thread pitch and size of fasteners
3.07.09	ability to make gaskets
3.07.10	ability to repair threads using tools such as taps, dies, chasers and thread inserts
3.07.11	ability to apply specialty sealants such as aerobic and anaerobic
3.07.12	ability to remove broken fasteners

Sub-task

3.08 Cleans components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

3.08.01	knowledge of cleaning solutions and solvents
3.08.02	knowledge of cleaning requirements for components
3.08.03	ability to select and use cleaning tools such as parts washers, scrapers, pressure washers and wire wheels

Sub-task

3.09 Verifies equipment repairs.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

3.09.01	knowledge of company policies and procedures such as work orders and checklists
3.09.02	knowledge of repair performed
3.09.03	knowledge of original complaint
3.09.04	ability to bench test rebuilt components such as starters, gear boxes and injectors
3.09.05	ability to perform sensory inspections

- 3.09.06 ability to advise operator of required follow-up procedures such as re-torques, fluid top-ups and break-in periods
- 3.09.07 ability to verify that dimensions/pressures are correct according to OEM specifications

BLOCK B

ENGINES AND ENGINE SUPPORT SYSTEMS

Trends

Engines are becoming more electronically managed than in the past and technicians need to adapt to new technology. Communication between different systems through the engine management system allows more variation and enhanced performance.

Related Components

(include, but not limited to)

Base engine: valves, pistons, connecting rods, blocks, cylinder heads, crankshaft, camshaft, counterbalance system, timing gears.

Lubrication system: oil filter, oil pan, cooling nozzles, oil pump, coolers, lube lines, pressure regulating devices.

Cooling system: water pump, external coolers, hoses, thermostat, radiator, fan drives, fan shrouds.

Intake/exhaust system: turbo chargers, intake pre-cleaners, intake and exhaust manifolds, gaskets, intercoolers, aftercoolers, mufflers, exhaust gas recirculation (EGR) system, waste gate exhaust system, exhaust brakes.

Fuel delivery system: pumps, injectors, tanks, check valves, lines, filters, water separators, regulators, carburetors, propane and gasoline systems.

Engine management system: electronic control module (ECM), sensors, solenoids, harnesses.

Tools and Equipment

See Appendix A.

Task 4

Performs engine diagnostics.

Context

The proper diagnosis of engines and supporting systems is critical to ensure optimum engine performance and efficiency. Qualified agricultural equipment technicians need to understand the complexity of the engine and the related systems that affect its operations.

Sub-task**4.01** Diagnoses base engine.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

4.01.01	knowledge of base engine components such as valves, pistons and blocks
4.01.02	knowledge of theory of operation of four-stroke and two-stroke engines
4.01.03	ability to select and use diagnostic tools and equipment
4.01.04	ability to perform specialized testing procedures such as dye testing, pressure testing and engine oil analysis
4.01.05	ability to perform sensory inspections
4.01.06	ability to check timing
4.01.07	ability to check valve adjustments
4.01.08	ability to perform compression tests (wet and dry)
4.01.09	ability to interpret diagnostic readings
4.01.10	ability to compare diagnostic results to OEM specifications
4.01.11	ability to complete failure analysis to determine root cause

Sub-task**4.02** Diagnoses lubrication system.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

4.02.01	knowledge of lubrication system components such as oil filter, oil pump, coolers, lube lines and pressure regulating devices
4.02.02	knowledge of lubrication system operation
4.02.03	knowledge of fluid classifications such as viscosity, American Petroleum Institute (API) and Society of Automotive Engineers (SAE) classifications
4.02.04	knowledge of inspection and testing procedures such as pressure tests
4.02.05	ability to select and use diagnostic tools and equipment such as pressure gauges and dyes
4.02.06	ability to identify oil contamination

4.02.07	ability to interpret test results
4.02.08	ability to identify failed, worn, damaged and defective components
4.02.09	ability to prepare oil analysis
4.02.10	ability to complete failure analysis to determine root cause

Sub-task

4.03

Diagnoses cooling system.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

4.03.01	knowledge of cooling system components such as water pump, thermostat, radiator and fan drives
4.03.02	knowledge of air cooling systems and components such as fins and air ducting
4.03.03	knowledge of cooling system operation and flow schematics
4.03.04	knowledge of inspection and testing procedures
4.03.05	knowledge of radiator cap relief pressure
4.03.06	knowledge of coolant classifications and additives
4.03.07	knowledge of hazards of pressurized cooling systems
4.03.08	ability to select and use diagnostic tools and equipment such as pressure testers, vacuums, dyes and litmus strips (pH test strip)
4.03.09	ability to identify coolant contamination
4.03.10	ability to interpret test results
4.03.11	ability to identify failed, worn, damaged and defective components
4.03.12	ability to identify blockages in radiators
4.03.13	ability to determine correct cooling fan operation
4.03.14	ability to complete failure analysis to determine root cause

Sub-task

4.04

Diagnoses intake/exhaust system.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

4.04.01	knowledge of intake/exhaust system components such as turbo chargers, intake pre-cleaners, intake and exhaust manifolds, gaskets, coolers, mufflers and EGR systems
4.04.02	knowledge of starting aids such as pre-heaters, ether injectors and glow plugs
4.04.03	knowledge of air flow problems
4.04.04	ability to select and use diagnostic tools and equipment such as pressure and temperature gauges
4.04.05	ability to identify intake system contamination such as dust, oil and antifreeze
4.04.06	ability to detect leaks in intake/exhaust systems
4.04.07	ability to inspect intake/exhaust components
4.04.08	ability to perform specialized intake testing procedures such as boost pressures and intake air temperatures
4.04.09	ability to test starting aids and turbo chargers
4.04.10	ability to interpret test results
4.04.11	ability to identify failed, worn, damaged and defective components
4.04.12	ability to complete failure analysis to determine root cause

Sub-task

4.05 Diagnoses fuel delivery system.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

4.05.01	knowledge of types of fuel delivery systems such as mechanical and electronically controlled
4.05.02	knowledge of gasoline fuelled systems
4.05.03	knowledge of high pressure systems
4.05.04	knowledge of fuel delivery system components such as pumps, injectors, tanks, check valves and lines
4.05.05	knowledge of fuel system operation
4.05.06	knowledge of types of fuels such as winter, summer and bio-fuel
4.05.07	knowledge of types of fuel additives

4.05.08	ability to recognize hazards of fuel delivery systems such as high voltage and high pressures
4.05.09	ability to interpret fuel system flow schematics
4.05.10	ability to inspect fuel delivery system
4.05.11	ability to identify fuel contamination
4.05.12	ability to select and use diagnostic tools and equipment such as pressure testing equipment and flowmeters
4.05.13	ability to perform pressure tests on fuel system components
4.05.14	ability to interpret test results
4.05.15	ability to recognize failed, worn, damaged and defective components
4.05.16	ability to identify carburetion problems such as improper air-fuel mixtures and leaks
4.05.17	ability to complete failure analysis to determine root cause

Sub-task

4.06 Diagnoses engine management systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

4.06.01	knowledge of engine management system components such as ECMs, sensors, solenoids and harnesses
4.06.02	knowledge of the operation, design and function of engine management systems
4.06.03	knowledge of electronic schematics
4.06.04	ability to perform specialized testing to determine electronic/electrical faults
4.06.05	ability to select and use diagnostic equipment such as computers, handheld devices, break-out harnesses and multimeters
4.06.06	ability to identify failed, worn, damaged and defective components
4.06.07	ability to interpret test results
4.06.08	ability to recognize other systems' interactions with the engine management system
4.06.09	ability to complete failure analysis to determine root cause

Task 5**Repairs engine and engine support systems.****Context**

The effective repair of engines and engine support systems is critical to engine performance and reliability. The engine is the vital part of the machine, as it is the power source for all operations. Technicians must possess a thorough understanding of these systems.

Sub-task**5.01****Repairs base engine.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

5.01.01	knowledge of base engine components such as cylinder heads, pistons and blocks
5.01.02	knowledge of theory of operation of four-stroke and two-stroke engines
5.01.03	ability to select and use tools and equipment
5.01.04	ability to prepare machine for engine removal
5.01.05	ability to disassemble base engine to determine component failures
5.01.06	ability to determine reusability of components
5.01.07	ability to rebuild cylinder heads
5.01.08	ability to repair and replace engine components
5.01.09	ability to reassemble base engine to OEM specifications
5.01.10	ability to measure tolerances and clearances such as liner protrusions, gear clearance and bearing clearance
5.01.11	ability to prepare machine for engine installation

Sub-task**5.02****Repairs lubrication system.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

5.02.01	knowledge of lubrication system components such as oil filter, oil pump, coolers, lube lines and pressure regulating devices
5.02.02	knowledge of lubrication system operation
5.02.03	knowledge of fluid classifications such as viscosity, API and SAE classifications
5.02.04	ability to select and use tools and equipment
5.02.05	ability to disassemble lubrication components to determine failures
5.02.06	ability to determine reusability of components
5.02.07	ability to replace components
5.02.08	ability to reassemble lubrication system
5.02.09	ability to check oil pressures

Sub-task

5.03

Repairs cooling system.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

5.03.01	knowledge of cooling system components such as water pump, thermostat, radiator and fan drives
5.03.02	knowledge of air cooling systems and components such as fins and air ducting
5.03.03	knowledge of cooling system operation and flow schematics
5.03.04	knowledge of hazards of pressurized cooling systems
5.03.05	ability to select and use tools and equipment
5.03.06	ability to disassemble cooling system components to determine failures such as blockages, leaks, wear, oxidation and erosion
5.03.07	ability to determine reusability of components
5.03.08	ability to reassemble cooling system
5.03.09	ability to clean and flush cooling system
5.03.10	ability to blow out external radiator blockages
5.03.11	ability to ensure adequate air flow in air-cooled systems
5.03.12	ability to test thermostat before installation
5.03.13	ability to remove, repair, rebuild and replace water pumps

Sub-task**5.04****Repairs intake/exhaust system.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

5.04.01	knowledge of intake/exhaust system components such as turbo chargers, intake pre-cleaners, intake manifold gaskets, coolers, mufflers and EGR systems
5.04.02	knowledge of starting aids such as pre-heaters, ether injectors and glow plugs
5.04.03	ability to select and use tools and equipment
5.04.04	ability to disassemble intake/exhaust system components
5.04.05	ability to determine reusability of components
5.04.06	ability to prepare components for reinstallation
5.04.07	ability to replace components
5.04.08	ability to reassemble intake/exhaust system
5.04.09	ability to adjust valve clearances

Sub-task**5.05****Repairs fuel delivery system.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

5.05.01	knowledge of types of fuel delivery systems such as mechanical and electronically controlled
5.05.02	knowledge of gasoline fuelled systems
5.05.03	knowledge of high pressure fuel systems
5.05.04	knowledge of fuel delivery system components such as pumps, injectors, tanks, check valves and lines
5.05.05	knowledge of fuel system operation
5.05.06	knowledge of types of fuels such as winter, summer and bio-fuel
5.05.07	knowledge of types of fuel additives

5.05.08	ability to select and use tools and equipment
5.05.09	ability to disassemble fuel delivery systems
5.05.10	ability to bleed diesel fuel system
5.05.11	ability to determine reusability of components
5.05.12	ability to test injectors
5.05.13	ability to repair components such as shimming mechanical injectors, calibrating electronic injectors and rebuilding fuel pumps
5.05.14	ability to repair and adjust carburetion systems
5.05.15	ability to prepare components for reinstallation
5.05.16	ability to replace components
5.05.17	ability to reassemble fuel delivery system

Sub-task

5.06 Repairs engine management systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

5.06.01	knowledge of engine management system components such as ECM, sensors, solenoids and harnesses
5.06.02	knowledge of the operation, design and function of engine management systems
5.06.03	ability to select and use tools and equipment
5.06.04	ability to remove and replace components
5.06.05	ability to repair components such as harnesses and connectors
5.06.06	ability to recalibrate sensors and switches
5.06.07	ability to recognize other systems' interactions with the engine management system
5.06.08	ability to reprogram parameters and update engine management system software

Trends

Drive trains are becoming more complex and efficient resulting in less operator input to complete the task. The introduction of new technology increases the difficulty of technicians to diagnose and repair the drive train. Computers are used more frequently to perform a diagnostic analysis on drive trains.

Related Components

(include, but not limited to)

Clutches: discs, center plates, release springs, bearings, pressure plates, pistons, seals, stators.

Driveline systems: drive shaft, u-joint, yokes, slip-joints, seals, steady bearings, support brackets, grease nipples, chains, sprockets, belts, sheaves.

Transmissions and gear boxes: seals, gaskets, gears, bearings, breathers, filters, oil pumps, shafts, planetaries, connectors, torque converters, coolers, valve bodies, clutch packs, wiring, solenoids, ECMs, shift rails, shift lever and knob, cylinders, gauges, sensors.

Differentials: seals, breathers, axles, gaskets, hubs, shafts, gears, planetaries, bearings, shift forks, filters, coolers, locking devices, sensors, wiring, solenoids, ECMs, clutch packs.

Tools and Equipment

See Appendix A.

Task 6

Diagnoses drive train.

Context

The drive train of agricultural equipment transfers power from the engine to components that need to be driven. The drive train allows for different applications.

The agricultural equipment technician performs a diagnostic analysis to identify the cause of the failure.

Sub-task**6.01**

Diagnoses clutches.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

6.01.01	knowledge of types of clutches such as push type, pull type, and wet and dry
6.01.02	knowledge of clutch failures
6.01.03	ability to select and use diagnostic tools and equipment
6.01.04	ability to disassemble clutch
6.01.05	ability to perform sensory inspections
6.01.06	ability to determine service limits
6.01.07	ability to complete failure analysis to determine root cause

Sub-task

6.02

Diagnoses driveline systems and components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

6.02.01	knowledge of driveline systems such as belts, chains and u-joints
6.02.02	knowledge of driveline components such as sprockets, bearings and shafts
6.02.03	knowledge of operational characteristics
6.02.04	ability to select and use diagnostic tools and equipment
6.02.05	ability to measure service limits
6.02.06	ability to perform sensory inspections
6.02.07	ability to remove driveline
6.02.08	ability to complete failure analysis to determine root cause

Sub-task

6.03

Diagnoses transmissions and gear boxes.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

6.03.01	knowledge of types of transmissions such as gear, power shift and variable transmission
6.03.02	knowledge of operational characteristics
6.03.03	knowledge of types of gear cuts such as bevel, helical and straight cut
6.03.04	knowledge of types of gear boxes such as reduction, planetary and directional change
6.03.05	knowledge of types of bearings such as ball, roller and needle
6.03.06	ability to select and use diagnostic tools and equipment
6.03.07	ability to perform sensory inspections
6.03.08	ability to complete failure analysis to determine root cause

Sub-task

6.04 Diagnoses differentials.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

6.04.01	knowledge of types of differentials such as hypoid, amboid and spiral bevel
6.04.02	knowledge of differential applications
6.04.03	knowledge of operational characteristics
6.04.04	knowledge of differential components such as bearings, bushings and seals
6.04.05	knowledge of differential locking systems
6.04.06	ability to select and use diagnostic tools and equipment
6.04.07	ability to perform sensory inspections
6.04.08	ability to recognize crown and pinion wear patterns
6.04.09	ability to complete failure analysis to determine root cause

Task 7

Repairs drive train.

Context

Agricultural equipment technicians repair drive trains by removing, reconditioning, replacing, installing and adjusting various components of the equipment.

Sub-task**7.01****Repairs clutches.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

7.01.01	knowledge of types of clutches such as push type, pull type, and wet and dry
7.01.02	knowledge of clutch components such as pressure plate, flywheel and disc
7.01.03	knowledge of removal and assembly procedures for various types of equipment according to OEM specifications
7.01.04	ability to select and use tools and equipment
7.01.05	ability to remove and disassemble clutches
7.01.06	ability to determine service limits
7.01.07	ability to replace failed components such as release bearings, pilot bearings and springs
7.01.08	ability to assemble, install and align clutches according to OEM specifications

Sub-task**7.02****Repairs driveline systems and components.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

7.02.01	knowledge of driveline systems such as belts, chains and u-joints
7.02.02	knowledge of driveline components such as sprockets, bearings and shafts
7.02.03	ability to select and use tools and equipment
7.02.04	ability to remove and disassemble components
7.02.05	ability to determine service limits
7.02.06	ability to replace failed components such as u-joints, yokes and hangers
7.02.07	ability to assemble and install components
7.02.08	ability to align and phase driveline systems and components

Sub-task**7.03**

Repairs transmissions and gear boxes.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

7.03.01	knowledge of types of transmissions such as gear, power shift and variable transmissions
7.03.02	knowledge of types of gear cuts such as bevel, helical and straight cut
7.03.03	knowledge of types of gear boxes such as reduction, planetary and directional change
7.03.04	knowledge of transmission and gear box components such as seals, bearings and gears
7.03.05	ability to remove and disassemble transmissions and gear boxes
7.03.06	ability to determine service limits
7.03.07	ability to replace failed components such as bearing and seals
7.03.08	ability to assemble and install transmissions and gear boxes

Sub-task**7.04**

Repairs differentials.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

7.04.01	knowledge of types of differentials such as hypoid, amboid and spiral bevel
7.04.02	knowledge of differential applications
7.04.03	knowledge of differential components such as bearings, bushings and seals
7.04.04	knowledge of differential locking systems
7.04.05	ability to select and use tools and equipment
7.04.06	ability to remove and disassemble components
7.04.07	ability to determine service limits
7.04.08	ability to replace failed components such as bearings and bevel pinions
7.04.09	ability to assemble and install components
7.04.10	ability to set differential crown and pinion according OEM specifications

BLOCK D

HYDRAULIC, HYDROSTATIC AND PNEUMATIC SYSTEMS

Trends

On-board air compressors on equipment are becoming more common. Hydraulics are becoming more sophisticated. They are also more compact and efficient.

Hydrostatics are a standard in the industry, and more machines are being equipped with this system because of the infinite speed control. The industry is moving towards increased use of pneumatic systems, other than in the standard suspension use.

Related Components

(include, but not limited to)

Hydraulic: pumps, rock-shafts/three point hitch, cylinders, motors, actuators, fluids, electrical controllers, wiring harnesses, valves.

Hydrostatic: motors, pumps, valves, electrical controllers, oil coolers, lines and hoses, fittings, wiring harnesses.

Pneumatic: pumps, tank, valves, air lines, actuators, accumulators, attenuators, dryers, air bags, air suspension, brake pots.

Tools and Equipment

See Appendix A.

Task 8

Diagnoses hydraulic, hydrostatic and pneumatic systems.

Context

Agricultural equipment technicians must be able to understand the theory of hydraulics. Technicians need the ability to differentiate whether the problem is electrical or hydraulic when doing diagnostics and the ability to use the proper testing equipment to help identify the problem.

Sub-task

8.01

Diagnoses hydraulic systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

8.01.01	knowledge of the basic theory of hydraulic systems
8.01.02	knowledge of the types and properties of hydraulic systems such as open-center, closed-center and blended
8.01.03	knowledge of mechanically-controlled and electronically-controlled hydraulic systems
8.01.04	knowledge of hydraulic system components such as charge pumps, cylinders and valves
8.01.05	knowledge of sensor functions
8.01.06	knowledge of fitting types and sizes
8.01.07	knowledge of common faults such as chafed or broken hoses and leaks
8.01.08	ability to select and use diagnostic tools and equipment
8.01.09	ability to identify power supplying drive systems
8.01.10	ability to verify fluid types and levels
8.01.11	ability to interpret hydraulic test results
8.01.12	ability to retrieve and interpret error codes
8.01.13	ability to perform sensory inspections
8.01.14	ability to verify whether the mechanically or electronically-controlled system is at fault
8.01.15	ability to interpret flow schematics and specifications
8.01.16	ability to perform failure analysis to determine root cause

Sub-task

8.02

Diagnoses hydrostatic systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

8.02.01	knowledge of hydrostatic systems theory and operating principles
8.02.02	knowledge of mechanically-controlled and electronically-controlled hydrostatic systems
8.02.03	knowledge of hydrostatic system components such as pumps, motors, reservoirs, controls, sensors and gauges
8.02.04	knowledge of hydraulic cooling system components
8.02.05	knowledge of safety bypass systems

8.02.06	knowledge of types of pumps and motors
8.02.07	knowledge of common faults such as chafed or broken hoses and leaks
8.02.08	ability to select and use diagnostic tools and equipment
8.02.09	ability to identify power supplying drive systems
8.02.10	ability to interpret flow schematics and specifications
8.02.11	ability to perform tests of hydrostatic system such as pressure and volume tests
8.02.12	ability to perform sensory inspections
8.02.13	ability to interpret test results
8.02.14	ability to perform failure analysis to determine root cause

Sub-task

8.03 Diagnoses pneumatic systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

8.03.01	knowledge of pneumatic systems theory and operating principles
8.03.02	knowledge of fitting types and sizes
8.03.03	ability to select and use diagnostic tools and equipment
8.03.04	ability to recognize hose size and properties
8.03.05	ability to locate leaks
8.03.06	ability to perform sensory inspections
8.03.07	ability to perform failure analysis to determine root cause

Task 9

Repairs hydraulic, hydrostatic and pneumatic systems.

Context

Agricultural equipment technicians must have the ability to use the proper tools and measuring devices to return the equipment to OEM specifications.

Sub-task**9.01****Repairs hydraulic systems.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

9.01.01	knowledge of the basic theory of hydraulic systems
9.01.02	knowledge of the types and properties of hydraulic systems such as open-center, closed-center and blended
9.01.03	ability to select and use tools and equipment
9.01.04	ability to remove and disassemble components to determine failure
9.01.05	ability to repair and replace power supplying drive systems
9.01.06	ability to repair and replace hydraulic system components such as charge pumps, cylinders and valves
9.01.07	ability to repair faults such as chafed, burst and leaking hoses
9.01.08	ability to assemble, install and adjust components

Sub-task**9.02****Repairs hydrostatic systems.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

9.02.01	knowledge of hydrostatic systems theory and operating principles
9.02.02	ability to remove, repair and replace hydrostatic system components such as pumps, motors, reservoirs, controls, sensors and gauges
9.02.03	ability to select and use tools and equipment
9.02.04	ability to remove and disassemble components to determine failure
9.02.05	ability to repair and replace pumps and motors
9.02.06	ability to repair and replace power supplying drive system
9.02.07	ability to repair faults such as chafed or burst hoses and leaks
9.02.08	ability to assemble, install and adjust components

Sub-task**9.03**

Repairs pneumatic systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

9.03.01	knowledge of pneumatic systems theory and operating principles
9.03.02	ability to select and use tools and equipment
9.03.03	ability to remove and disassemble components to determine failure
9.03.04	ability to repair and replace compressors and components
9.03.05	ability to seal leaks
9.03.06	ability to reassemble, install and adjust components

BLOCK E

ELECTRICAL AND ELECTRONIC SYSTEMS

Trends

Electrical and electronic systems are increasing in use. New technologies such as GPS tracking and automated steering are becoming more widely used. Other accessories are continually being introduced to increase crop yield, reduce costs and decrease environmental impact. Many accessories are being introduced to reduce operator fatigue.

Related Components (include, but not limited to)

Electrical: batteries, sensors, alternators, regulators, starting aid systems, wiring, relays, starters, cables, switches, solenoids, fuses, breakers, rotary beacons, block heaters, seat heaters, fusible links, ignition coils, pick-up coils, coil packs.

Electronic: light emitting diodes (LEDs), modules, actuators, printed circuit boards, multi-function controls, connectors, data links, communication plugs, terminating resistors, ECMs, sensors.

Tools and Equipment

See Appendix A.

Task 10

Diagnoses electrical power and control/monitoring systems.

Context

Electrical and electronic systems are integrated and support each other. These integrated systems are diagnosed together. Spark ignition systems are used on older agricultural equipment and smaller machines and implements.

Sub-task

10.01

Diagnoses electrical and electronic components and accessories.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

10.01.01	knowledge of electrical subsystems such as starting and charging systems
10.01.02	knowledge of electrical components such as batteries, actuators, alternators and switches
10.01.03	knowledge of electronic components such as ECMs, printed circuit boards and multi-function controls
10.01.04	knowledge of equipment accessories and options such as GPS, automated steering and entertainment systems
10.01.05	knowledge of integrated implement control systems and monitors
10.01.06	knowledge of gauges of electrical wiring and types of connectors
10.01.07	ability to select and use electrical testing equipment such as multimeters, laptops and onboard diagnostic systems
10.01.08	ability to recognize electrical failures and faults such as corroded wires, poor grounds and bad connections
10.01.09	ability to interpret and use schematics
10.01.10	ability to interpret information from diagnostics and follow flow charts
10.01.11	ability to perform failure analysis to determine root cause

Sub-task

10.02 Diagnoses spark ignition.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

10.02.01	knowledge of spark ignition systems and their operating characteristics
10.02.02	knowledge of spark ignition components such as spark plugs, points, condensers, distributors, pick-up coils and ignition modules
10.02.03	knowledge of basic electrical theory such as Ohm's law
10.02.04	ability to select and use diagnostic tools and equipment
10.02.05	ability to recognize component faults such as faulty spark plugs, coil failures and burnt points
10.02.06	ability to check ignition timing
10.02.07	ability to perform failure analysis to determine root cause

Task 11**Repairs electrical power and control/monitoring systems.****Context**

Electrical and electronic systems are integrated and support each other. These integrated systems are repaired together.

Spark ignition systems are used on older agricultural equipment and smaller machines and implements.

Sub-task**11.01****Repairs electrical and electronic components and accessories.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

11.01.01	knowledge of electrical subsystems such as starting and charging systems
11.01.02	knowledge of electrical components such as batteries, actuators, alternators and switches
11.01.03	knowledge of electronic components such as ECMs, printed circuit boards and multi-function controls
11.01.04	knowledge of equipment accessories and options such as GPS, automated steering and entertainment systems
11.01.05	knowledge of integrated implement control systems and monitors
11.01.06	knowledge of gauges of electrical wiring and types of connectors
11.01.07	ability to select and use tools and equipment
11.01.08	ability to remove and disassemble electrical and electronic components
11.01.09	ability to assemble, install and adjust components and accessories
11.01.10	ability to recondition electrical components such as starters, solenoids and alternators
11.01.11	ability to perform electrical and electronic repairs such as splicing, soldering and reconditioning connectors

Sub-task**11.02****Repairs spark ignition.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

- 11.02.01 knowledge of spark ignition systems and their operating characteristics
- 11.02.02 knowledge of spark ignition components such as spark plugs, points, condensers, distributors, pick-up coils and ignition modules
- 11.02.03 knowledge of basic electrical theory
- 11.02.04 ability to select and use tools and equipment
- 11.02.05 ability to remove and disassemble components
- 11.02.06 ability to recondition and install components
- 11.02.07 ability to adjust ignition timing
- 11.02.08 ability to set and adjust point gap and ignition module air gap

BLOCK F

STEERING, SUSPENSION AND BRAKES

Trends

Electronic control steering, suspension and brake systems have become more efficient due to market demand. Electronic/GPS controlled steering is now used to save time and money for the operator.

The width and track pattern (foot print) of equipment is changing to provide less compaction and more traction.

Related Components (include, but not limited to)

Steering systems: hydraulic cylinders, orbital steering pumps, tie rods, priority valves, ECMs, sensors, hoses, hydraulic pumps, filters, seals, fittings.

Brake systems: hydraulic cylinders, discs, brake valves, priority valves, seals, hoses, lines, hydraulic pumps, bleed screws, housings, pistons, ECMs, sensors, fittings.

Wheels/tracks and undercarriage: bias and radial tires, rims, drive wheels, rubber tracks, support wheels, accumulators, cylinders, pins, bushings, ECMs, sensors, hubs, bearings, seals, frames.

Cushioning devices: fittings, hoses, ECMs, sensors, air bags, shocks, accumulators, compressor, hydraulic pumps, valves, mounts, lines, cylinders, springs.

Tools and Equipment

See Appendix A.

Task 12

Diagnoses steering and brake systems.

Context

The steering system on agricultural equipment allows the operator to control the direction from left to right, within limits. The brake system allows the operator to stop the equipment and assists in steering. The emergency brake system is used for parking and emergency stopping. Agricultural equipment technicians perform diagnostic analyses to identify the cause of the failure.

Sub-task**12.01**

Diagnoses steering systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

12.01.01	knowledge of steering systems theory and operating principles
12.01.02	knowledge of types of steering systems such as hydraulic, mechanical and hydrostatic
12.01.03	knowledge of steering system components such as hydraulic cylinders, orbital steering pumps, tie rods and priority valves
12.01.04	knowledge of steering system component failures
12.01.05	knowledge of allowable tolerances according to OEM specifications
12.01.06	ability to select and use diagnostic tools and equipment such as pressure gauges, dial indicators and tape measures
12.01.07	ability to perform sensory inspections
12.01.08	ability to complete failure analysis to determine root cause
12.01.09	ability to recognize other systems' interactions with the steering system

Sub-task**12.02**

Diagnoses brake systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

12.02.01	knowledge of brake systems theory and operating principles
12.02.02	knowledge of types of brake systems such as hydraulic, mechanical and hydrostatic
12.02.03	knowledge of parking and emergency brake systems
12.02.04	knowledge of brake system components such as hydraulic cylinders, discs, brake valves and priority valves
12.02.05	knowledge of brake component failures
12.02.06	knowledge of allowable tolerances according to OEM specifications
12.02.07	ability to select and use diagnostic tools and equipment such as pressure gauges, calipers and measuring tools

12.02.08	ability to disassemble brake system
12.02.09	ability to perform sensory inspections
12.02.10	ability to complete failure analysis to determine root cause

Task 13

Repairs steering and brake systems.

Context

In order to operate equipment safely, steering and brake systems need to perform within operating parameters. Agricultural equipment technicians repair steering and brake systems by removing, repairing, replacing, installing and adjusting various components of the equipment as per OEM specifications and recommendations.

Sub-task

13.01

Repairs steering systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

13.01.01	knowledge of steering systems theory and operating principles
13.01.02	knowledge of types of steering systems such as hydraulic, mechanical and hydrostatic
13.01.03	knowledge of steering system components such as hydraulic cylinders, orbital steering pumps, and sensors
13.01.04	knowledge of allowable tolerances according to OEM specifications
13.01.05	ability to select and use tools and equipment
13.01.06	ability to remove and disassemble steering components
13.01.07	ability to determine service limits
13.01.08	ability to replace worn and damaged components such as tie rods, seals and hoses
13.01.09	ability to repair components such as orbital steering pumps, priority valves and cylinders
13.01.10	ability to perform adjustments such as toe-in and toe-out, and system pressures
13.01.11	ability to assemble and install steering components according to OEM specifications

Sub-task**13.02****Repairs brake systems.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

13.02.01	knowledge of brake systems theory and operating principles
13.02.02	knowledge of types of brake systems such as hydraulic, mechanical and hydrostatic
13.02.03	knowledge of parking and emergency brake systems
13.02.04	knowledge of brake system components such as hydraulic cylinders, discs, brake valves and priority valves
13.02.05	knowledge of allowable tolerances according to OEM specifications
13.02.06	ability to select and use tools and equipment
13.02.07	ability to remove and disassemble brake components
13.02.08	ability to determine service limits
13.02.09	ability to replace worn and damaged components such as discs, pistons and plates
13.02.10	ability to repair components such as linkages, brake valves, priority valves and brake cylinders
13.02.11	ability to bleed and adjust brakes
13.02.12	ability to assemble and install brake components according to OEM specifications
13.02.13	ability to adjust components such as linkages, pedals and valves

Task 14**Diagnoses suspension components.****Context**

The suspension on agricultural equipment allows for operator comfort, and helps improve traction and steering.

Diagnostic analysis is performed by agricultural equipment technicians to identify the cause of the component failure.

Sub-task**14.01****Diagnoses wheels/tracks and undercarriage.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

14.01.01	knowledge of wheels/tracks and undercarriage theory and operating principles
14.01.02	knowledge of wheels components such as bias tires, radial tires and rims
14.01.03	knowledge of track and undercarriage components such as rubber tracks, support wheels and tensioning systems
14.01.04	knowledge of wheels/tracks and undercarriage component failures
14.01.05	knowledge of allowable tolerances according to OEM specifications
14.01.06	ability to select and use diagnostic tools and equipment such as pressure gauges and tape measures
14.01.07	ability to perform sensory inspections
14.01.08	ability to complete failure analysis to determine root cause

Sub-task**14.02****Diagnoses cushioning devices.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

14.02.01	knowledge of cushioning devices theory and operating principles
14.02.02	knowledge of types of cushioning devices such as springs, accumulators, air bags and seats
14.02.03	knowledge of cushioning device components such as fittings, hoses and sensors
14.02.04	knowledge of cushioning component failures
14.02.05	knowledge of allowable tolerances according to OEM specifications
14.02.06	knowledge of safety procedures for inspection of components according to OEM recommendations
14.02.07	ability to select and use diagnostic tools and equipment such as pressure gauges, multimeters and tape measures

14.02.08	ability to perform sensory inspections
14.02.09	ability to complete failure analysis to determine root cause

Task 15

Repairs suspension components.

Context

Suspensions need to be repaired in order to maintain operation of equipment, to minimize damage to other components and to reduce fatigue of the operator.

Sub-task

15.01

Repairs wheels/tracks and undercarriage.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

15.01.01	knowledge of wheels/tracks and undercarriage theory and operating principles
15.01.02	knowledge of wheels components such as bias tires and radial tires, and rims
15.01.03	knowledge of track and undercarriage components such as rubber tracks, support wheels and tensioning systems
15.01.04	knowledge of allowable tolerances according to OEM specifications
15.01.05	ability to select and use tools and equipment
15.01.06	ability to remove wheel components
15.01.07	ability to remove and disassemble tracks and undercarriages components
15.01.08	ability to determine service limits
15.01.09	ability to replace worn and damaged components such as fasteners, idlers, pins and bushings
15.01.10	ability to repair components such as tensioning devices, idlers and rims
15.01.11	ability to align tensioning idlers on track systems
15.01.12	ability to assemble and install components according to OEM specifications
15.01.13	ability to adjust wheel track width

Sub-task**15.02**

Repairs cushioning devices.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

15.02.01	knowledge of cushioning devices theory and operating principles
15.02.02	knowledge of types of cushioning devices such as springs, accumulators, air bags and seats
15.02.03	knowledge of cushioning device components such as fittings, hoses and sensors
15.02.04	knowledge of allowable tolerances and safety procedures for repair of components according to OEM specifications
15.02.05	ability to select and use tools and equipment
15.02.06	ability to remove and disassemble cushioning device components
15.02.07	ability to determine service limits
15.02.08	ability to replace cushioning device components such as air bags, shocks, pins, bushing and electrical components
15.02.09	ability to repair cushioning device components such as suspension cylinders, valves and pivot points
15.02.10	ability to assemble and install components according to OEM specifications

BLOCK G

STRUCTURAL COMPONENTS AND OPERATOR STATION

Trends

There is an increase in the use of automatic climate control systems to accommodate operator comfort. This makes the diagnosis more complex.

Related Components

**(include, but not
limited to)**

Frame components: pivot points, frame rails, gussets, flanges, connecting members, sub-frames.

Equipment body: hoods, screens, shields, glass, tin work, roof, doors, hinges, seals, fenders, fire wall.

Heating and ventilation systems: heater cores, cab filters, air ducting, fans, controls.

Air conditioning systems: compressors, condensers, receiver-dryers, thermal expansion valves, orifice tubes, evaporators, hoses.

Tools and Equipment

See Appendix A.

Task 16

Diagnoses structural components.

Context

The structural components on agricultural equipment enclose and support the operator and the equipment.

For safety purposes and operator comfort, agricultural equipment technicians perform sensory inspections to verify integrity of the structural components.

Sub-task

16.01

Diagnoses frame components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

16.01.01 knowledge of frame components such as pivot points, frame rails, gussets, flanges and connecting members

16.01.02	knowledge of types and properties of metals
16.01.03	knowledge of allowable tolerances according to OEM specifications
16.01.04	ability to select and use diagnostic tools and equipment such as tape measures, levels and squares
16.01.05	ability to visually inspect to identify common defects such as cracks, fatigue, loose fasteners and oxidation
16.01.06	ability to verify required dimensions according to OEM specifications

Sub-task

16.02

Verifies condition of roll-over protective structure (ROPS).

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

16.02.01	knowledge of ROPS
16.02.02	ability to select and use diagnostic tools and equipment such as tape measures and squares
16.02.03	ability to visually inspect to identify common defects such as cracks, fatigue, loose fasteners and oxidation
16.02.04	ability to verify required dimensions according to OEM specifications

Sub-task

16.03

Diagnoses equipment body.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

16.03.01	knowledge of equipment body components such as hoods, screens, shields, glass, tin work and roof
16.03.02	knowledge of properties of materials such as metal, fibreglass and plastics
16.03.03	ability to visually inspect to identify common defects such as cracks, fatigue, loose fasteners and oxidation
16.03.04	ability to perform sensory inspections to identify defects such as air leaks, water leaks and cab noises

Task 17**Repairs structural components.****Context**

Structural components require repair or replacement when they are damaged. Frame components must be at the OEM specifications to operate properly. Body equipment is restored for functional and aesthetic purposes.

Agricultural equipment technicians are not certified to alter or repair ROPS. Therefore, any failure results in a replacement.

Sub-task**17.01****Repairs frame components.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

17.01.01	knowledge of frame components such as pivot points, frame rails, gussets, flanges and connecting members
17.01.02	knowledge of types and properties of metals
17.01.03	knowledge of reinforcement methods
17.01.04	ability to select and use tools and equipment
17.01.05	ability to remove and disassemble frame components
17.01.06	ability to prepare frame components for repair using processes such as gouging, grinding and cutting
17.01.07	ability to weld and cut frame components
17.01.08	ability to fasten components by using methods such as bolting, riveting and plating
17.01.09	ability to reassemble and install frame components
17.01.10	ability to prepare and paint frame

Sub-task**17.02****Replaces ROPS.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

17.02.01	knowledge of ROPS
17.02.02	ability to select and use tools
17.02.03	ability to install ROPS according to OEM specifications

Sub-task

17.03 Repairs equipment body.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

17.03.01	knowledge of equipment body components such as hoods, screens, shields, glass, tin work and roof
17.03.02	knowledge of properties of materials such as metal, fibreglass and plastics
17.03.03	knowledge of bonding agents such as silicone, weatherstripping glue and foam adhesive
17.03.04	knowledge of body material such as body fill, fibreglass resin and primers
17.03.05	ability to select and use tools and equipment
17.03.06	ability to remove and disassemble equipment body components
17.03.07	ability to replace worn and damaged components such as hinges, latches and glass
17.03.08	ability to repair components such as hinges, brackets and steps
17.03.09	ability to weld and cut body components
17.03.10	ability to assemble and install equipment body components
17.03.11	ability to prepare surfaces and paint components

Task 18

Diagnoses climate control systems.

Context

Climate control systems maintain interior cab temperature to optimize comfort as requested by the operator.

Diagnostic analyses are performed by agricultural equipment technicians to identify the cause of the malfunction in the climate control system.

Sub-task**18.01****Diagnoses heating and ventilation systems.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

18.01.01	knowledge of heating and ventilation systems theory and operating principles
18.01.02	knowledge of heating and ventilation components such as heater core, cab filters and air ducting
18.01.03	knowledge of heating and ventilation component failures such as noisy fans, leaking heater cores and burnt resistors
18.01.04	ability to select and use diagnostic tools and equipment such as temperature gauges, multimeters and leak detection tools
18.01.05	ability to disassemble heating and ventilation system
18.01.06	ability to perform sensory inspections
18.01.07	ability to perform failure analysis to determine root cause

Sub-task**18.02****Diagnoses air conditioning systems.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

18.02.01	knowledge of air conditioning systems theory and operating principles
18.02.02	knowledge of air conditioning components such as compressors, condensers, receiver-dryers, thermal expansion valves, evaporators and hoses
18.02.03	knowledge of air conditioning component failures such as ruptured hoses, failed compressors and cracked cores
18.02.04	knowledge of refrigerants
18.02.05	knowledge of regulations concerning refrigerants
18.02.06	ability to select and use diagnostic tools and equipment such as temperature gauges, pressure gauges, multimeters and leak detection tools
18.02.07	ability to access air conditioning system to perform diagnosis
18.02.08	ability to perform sensory inspections

18.02.09	ability to perform failure analysis to determine root cause
18.02.10	ability to recognize other systems' interactions with the air conditioning system such as ECM and sensors

Task 19

Repairs climate control systems.

Context

Agricultural equipment technicians repair climate control systems by adjusting, repairing or replacing components.

Sub-task

19.01

Repairs heating and ventilation systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

19.01.01	knowledge of heating and ventilation systems theory and operating principles
19.01.02	knowledge of heating and ventilation components such as heater core, cab filters and air ducting
19.01.03	ability to select and use tools and equipment
19.01.04	ability to remove and disassemble heating and ventilation components
19.01.05	ability to determine service limits
19.01.06	ability to replace worn and damaged components such as fans, resistors, motors and heater cores
19.01.07	ability to repair components such as heater cores and fan assemblies
19.01.08	ability to adjust components such as fan assemblies and air distribution controls
19.01.09	ability to assemble and install heating and ventilation components according to OEM specifications

Sub-task**19.02**

Repairs air conditioning systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

19.02.01	knowledge of air conditioning systems theory and operating principles
19.02.02	knowledge of air conditioning components such as compressors, condensers, receiver-dryers, thermal expansion valves, evaporators and hoses
19.02.03	ability to select and use tools and equipment such as pressure gauges, temperature sensors, multimeters, recovery devices and vacuum pumps
19.02.04	ability to remove and disassemble air conditioning components
19.02.05	ability to determine service limits
19.02.06	ability to replace worn and damaged components
19.02.07	ability to repair compressors and hoses
19.02.08	ability to adjust pressure sensors
19.02.09	ability to assemble and install air conditioning components according to OEM specifications

BLOCK H

AGRICULTURAL EQUIPMENT

Trends

While the basic principles of agricultural equipment are similar, each brand is developing new technology. Many diagnostics, adjustments and repairs are thus brand-specific, and non-transferable. Accordingly, there is an increase in in-house training and manufacturer-specific training.

Crop diversification, new equipment, new technologies, use of electronics and specialized software require agricultural equipment technicians to broaden their range of skills.

There is an increase in farming trends to straight cut harvesting from swathing, resulting in more repairs to straight-cut headers. In some regions, zero till or low tillage operations are becoming more common, with a reduction of work on tillage equipment.

Related Components

(include, but not limited to)

Land preparation tools: disc-harrows, sub-rippers, brush cutters, rock rakes, rock pickers, land levellers.

Tillage implements: chisel plows, discs, tandem discs, cultivators.

Seeding implements: air seeders, air drills, planters, hoe drills, press drills.

Harvesting equipment: combines, swathers, harvesters.

Forage and hay equipment: round and square balers, mower conditioners, discbines, forage harvesters, wheel rakes, swath turners, hay tedders, headers, rakes, hay preservative applicators.

Application equipment: sprayers, granular applicators.

Irrigation equipment: pumps, reels, plumbing, controllers.

Tools and Equipment

See Appendix A.

Task 20

Prepares agricultural equipment.

Context

Agricultural equipment is considered to be any attachments (e.g. balers, headers, seeding and tillage machines, rakes) attached to power units (e.g. combines, tractors, swather-traction units, high-clearance sprayers and forage harvesters). These are types of equipment that cut, process and deliver products.

Sub-task**20.01****Assembles agricultural equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

20.01.01	knowledge of types of agricultural equipment and options
20.01.02	ability to select and use tools and equipment
20.01.03	ability to follow assembly instructions

Sub-task**20.02****Installs agricultural equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

20.02.01	knowledge of types of agricultural equipment and options
20.02.02	knowledge of class of drive lines such as 540 and 1000
20.02.03	knowledge of hydraulic connections and adapters
20.02.04	knowledge of voltage connections and accessory power
20.02.05	ability to select and use tools and equipment
20.02.06	ability to install drives according to specifications for equipment such as sprayers, air drills, headers, balers and rakes
20.02.07	ability to locate power sources on equipment

Sub-task**20.03****Performs pre-delivery adjustments on agricultural equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

20.03.01	knowledge of types of agricultural equipment and options
----------	--

20.03.02	knowledge of connections and adapters
20.03.03	knowledge of adjustments according to the types of crops such as clearances, speed and conditions
20.03.04	ability to select and use tools and equipment
20.03.05	ability to locate and interpret charts
20.03.06	ability to ballast equipment
20.03.07	ability to set equipment according to specifications and conditions
20.03.08	ability to verify optimal performance of equipment

Task 21

Diagnoses land preparation tools, tillage implements and seeding/planting implements.

Context

Farming practices, soil conditions and crop selection affect land preparation tools, tillage implements and seeding/planting requirements. Technicians must understand these conditions, as well as the implement characteristics, to be able to diagnose failures. Visual acuity is important for both alignment and levelling of the equipment. Technicians must be up-to-date on the latest developments of seeding and tillage practices.

Sub-task

21.01

Diagnoses land preparation tools.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

21.01.01	knowledge of the basic operations of land preparation tools and operating systems
21.01.02	knowledge of types of land preparation tools
21.01.03	knowledge of land preparation tool drafting
21.01.04	knowledge of pin connections and wiring harnesses
21.01.05	ability to recognize common wear points
21.01.06	ability to select and use diagnostic tools and equipment
21.01.07	ability to test tire pressure and walking axle wear

Sub-task**21.02**

Diagnoses tillage implements.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

21.02.01	knowledge of the basic operations of tillage implements and operating systems
21.02.02	knowledge of types of tillage implements
21.02.03	knowledge of tillage implements drafting
21.02.04	knowledge of depth control units
21.02.05	knowledge of pin connections and wiring harnesses
21.02.06	knowledge of hazards associated with treated seed
21.02.07	ability to recognize common wear points
21.02.08	ability to select and use diagnostic tools and equipment
21.02.09	ability to measure furrow depth and uniformity
21.02.10	ability to test tire pressure and walking axle wear

Sub-task**21.03**

Diagnoses seeding and planting implements.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

21.03.01	knowledge of the basic operations of seeding and planting implements and their operating systems
21.03.02	knowledge of types of seeding and planting implements
21.03.03	knowledge of seeding and planting implement drafting
21.03.04	knowledge of depth and metering control units
21.03.05	knowledge of types of packers such as rubber and steel
21.03.06	knowledge of opener spacing
21.03.07	knowledge of pin connections and wiring harnesses
21.03.08	ability to select and use diagnostic tools and equipment
21.03.09	ability to recognize faulty sensors such as air velocity, speed and bin level

21.03.10	ability to recognize common wear points
21.03.11	ability to measure seed depth and uniformity
21.03.12	ability to test tire pressure
21.03.13	ability to recognize improper seed rates

Task 22

Adjusts land preparation tools, tillage implements and seeding/planting implements.

Context

Agricultural equipment technicians adjust land preparation tools, tillage implements and seeding/planting implements according to customer needs and preferences.

Sub-task

22.01 Adjusts land preparation tools.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

22.01.01	knowledge of the basic operations of land preparation tools and operating systems
22.01.02	knowledge of types of land preparation tools
22.01.03	knowledge of land preparation tool drafting
22.01.04	ability to select and use tools and equipment
22.01.05	ability to set monitors according to application
22.01.06	ability to adjust tire pressure and stops to level tool
22.01.07	ability to set tools according to specifications and conditions

Sub-task

22.02 Adjusts tillage implements.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

22.02.01	knowledge of the basic operations of tillage implements and operating systems
22.02.02	knowledge of types of tillage implements
22.02.03	knowledge of tillage implements drafting
22.02.04	knowledge of depth control units
22.02.05	ability to select and use diagnostic tools and equipment
22.02.06	ability to set monitors according to application
22.02.07	ability to adjust tire pressure and stops to level implement
22.02.08	ability to adjust openers for depth and uniformity
22.02.09	ability to set implements according to specifications and conditions

Sub-task

22.03

Adjusts seeding and planting implements.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

22.03.01	knowledge of the basic operations of seeding and planting implements and their operating systems
22.03.02	knowledge of types of seeding and planting implements
22.03.03	knowledge of seeding and planting implement drafting
22.03.04	knowledge of depth and metering control units
22.03.05	knowledge of types of packers such as rubber and steel
22.03.06	ability to select and use tools and equipment
22.03.07	ability to set monitors according to application
22.03.08	ability to set sensors such as velocity, speed and rate
22.03.09	ability adjust seed rates and tire pressure
22.03.10	ability to adjust opener spacing according to packer placement
22.03.11	ability to adjust air plenums and dampers
22.03.12	ability to adjust metering rolls
22.03.13	ability to set equipment according to specifications and conditions

Task 23**Repairs land preparation tools, tillage implements and seeding/planting implements.****Context**

Depending on soil conditions, tillage implements optimize yield. Seeding and planting implements must be adjusted according to soil condition and crop type.

Sub-task**23.01****Repairs land preparation implements.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

23.01.01	knowledge of the basic operations of land preparation tools and operating systems
23.01.02	knowledge of types of land preparation tools
23.01.03	knowledge of land preparation tool drafting
23.01.04	ability to select and use tools and equipment
23.01.05	ability to remove and disassemble components
23.01.06	ability to repair and replace components such as shanks, sweeps, flails, gearboxes, bearings and shafts
23.01.07	ability to assemble, install and adjust components

Sub-task**23.02****Repairs tillage implements.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

23.02.01	knowledge of the basic operations of tillage implements and operating systems
23.02.02	knowledge of types of tillage implements
23.02.03	knowledge of tillage implements drafting
23.02.04	ability to select and use tools and equipment

23.02.05	ability to measure furrow depth and uniformity to level implements
23.02.06	ability to calibrate depth control units
23.02.07	ability to remove and disassemble components
23.02.08	ability to repair and replace components such as depth control sensors, wiring harnesses and pin connectors
23.02.09	ability to assemble, install and adjust components

Sub-task

23.03

Repairs seeding and planting implements.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

23.03.01	knowledge of the basic operations of seeding and planting implements and their operating systems
23.03.02	knowledge of types of seeding and planting implements
23.03.03	knowledge of seeding and planting implement drafting
23.03.04	ability to select and use tools and equipment
23.03.05	ability to repair seeding and planting implement components
23.03.06	ability to remove, repair and replace sensors such as velocity, shaft speed and bin level
23.03.07	ability to repair metering components such as variable rate and tank pressures
23.03.08	ability to measure furrow depth and uniformity to level the implement
23.03.09	ability to calibrate depth control units
23.03.10	ability to measure and set opener spacing

Task 24

Diagnoses harvesting, forage and hay equipment.

Context

This equipment collects, processes and transports crops and products. To improve the operation and functioning of the equipment, technicians should understand the principles of operation.

Sub-task**24.01****Diagnoses cutting and conditioning equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

24.01.01	knowledge of the basic operations of cutting and conditioning equipment and operating systems
24.01.02	knowledge of types of cutting and conditioning equipment
24.01.03	knowledge of types of crops
24.01.04	knowledge of equipment usage according to different crops and crop conditions
24.01.05	knowledge of knife register and angle
24.01.06	knowledge of wear tolerances such as worn guards and knife hold-downs
24.01.07	knowledge of reel position and finger timing
24.01.08	ability to select and use diagnostic tools and equipment
24.01.09	ability to perform failure analysis to determine root cause
24.01.10	ability to recognize worn and damaged components
24.01.11	ability to recognize misaligned drives

Sub-task**24.02****Diagnoses gathering equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

24.02.01	knowledge of the basic operations of gathering equipment and operating systems
24.02.02	knowledge of types of gathering equipment such as balers, combines and forage harvesters
24.02.03	knowledge of precision agricultural equipment such as for yield, moisture and guidance
24.02.04	ability to select and use diagnostic tools and equipment
24.02.05	ability to perform failure analysis to determine root cause
24.02.06	ability to recognize common defects and worn components

Sub-task**24.03**

Diagnoses processing equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

24.03.01	knowledge of the basic operations of processing equipment and operating systems
24.03.02	knowledge of types of processing equipment such as combines, feeders, dryers and mixers
24.03.03	knowledge of precision agricultural equipment such as for yield, moisture and guidance
24.03.04	ability to select and use diagnostic tools and equipment
24.03.05	ability to perform failure analysis to determine root cause
24.03.06	ability to recognize worn parts such as cutting knives, cutter heads and shear bars
24.03.07	ability to calibrate monitoring equipment

Sub-task**24.04**

Diagnoses delivery equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

24.04.01	knowledge of the basic operations of delivery equipment and operating systems
24.04.02	knowledge of types of delivery equipment such as grain carts, high-dump wagons and manure spreaders
24.04.03	ability to select and use diagnostic tools and equipment
24.04.04	ability to perform failure analysis to determine root cause
24.04.05	ability to recognize worn parts such as augers, flighting and floor chains

Task 25**Adjusts harvesting, forage and hay equipment.****Context**

Agricultural equipment technicians adjust harvesting, forage and hay equipment according to customer needs and preferences. To optimize the performance of the equipment, an adjustment may be the only work required.

Sub-task**25.01****Adjusts cutting and conditioning equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

25.01.01	knowledge of the basic operations of cutting and conditioning equipment and operating systems
25.01.02	knowledge of types of cutting and conditioning equipment
25.01.03	knowledge of types of crops
25.01.04	knowledge of wear tolerances such as worn guards and knife hold-downs
25.01.05	ability to select and use tools and equipment
25.01.06	ability to adjust belt and chain tension
25.01.07	ability to match ground speed and reel speed according to conditions
25.01.08	ability to align drive sheaves and driven sheaves
25.01.09	ability to adjust the knife register and angle
25.01.10	ability to match system settings according to crops
25.01.11	ability to adjust reel position and finger timing
25.01.12	ability to match push bar/lean bar settings to crop conditions
25.01.13	ability to set equipment according to specifications and conditions

Sub-task**25.02****Adjusts gathering equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

25.02.01	knowledge of the basic operations of gathering equipment and operating systems
25.02.02	knowledge of types of gathering equipment such as balers, combines and forage harvesters
25.02.03	ability to select and use tools and equipment
25.02.04	ability to set equipment according to specifications and conditions
25.02.05	ability to adjust belt and chain tension
25.02.06	ability to match ground speed and reel speed according to conditions
25.02.07	ability to align drive sheaves and driven sheaves
25.02.08	ability to adjust the knife register and angle
25.02.09	ability to match system settings according to crops
25.02.10	ability to adjust reel position and finger timing

Sub-task

25.03 **Adjusts processing equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

25.03.01	knowledge of the basic operations of processing equipment and operating systems
25.03.02	knowledge of types of processing equipment such as combines, feeders, dryers and mixers
25.03.03	ability to select and use tools and equipment
25.03.04	ability to calibrate monitoring equipment
25.03.05	ability to set equipment according to specifications and conditions
25.03.06	ability to adjust belt and chain tension
25.03.07	ability to match ground speed and reel speed according to conditions
25.03.08	ability to align drive sheaves and driven sheaves
25.03.09	ability to adjust the knife register and angle
25.03.10	ability to match system settings according to crops
25.03.11	ability to adjust reel position and finger timing

Sub-task**25.04** Adjusts delivery equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

25.04.01	knowledge of the basic operations of delivery equipment and operating systems
25.04.02	knowledge of types of delivery equipment such as grain carts, high-dump wagons and manure spreaders
25.04.03	ability to select and use tools and equipment
25.04.04	ability to set equipment according to specifications and conditions
25.04.05	ability to adjust belt and chain tension
25.04.06	ability to align drive sheaves and driven sheaves

Task 26

Repairs harvesting, forage and hay equipment.

Context

Agricultural equipment technicians repair harvesting, forage and hay equipment according to OEM specifications or customer needs and preferences.

Sub-task**26.01** Repairs cutting and conditioning equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

26.01.01	knowledge of the basic operations of cutting and conditioning equipment and operating systems
26.01.02	knowledge of types of cutting and conditioning equipment
26.01.03	ability to select and use tools and equipment
26.01.04	ability to remove and disassemble components
26.01.05	ability to repair and replace damaged components

26.01.06	ability to heat and bend metals back into shape
26.01.07	ability to sharpen knives for cutter assemblies
26.01.08	ability to prepare and weld components
26.01.09	ability to assemble, install and adjust components

Sub-task

26.02 Repairs gathering equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

26.02.01	knowledge of the basic operations of gathering equipment and operating systems
26.02.02	knowledge of types of gathering equipment such as balers, combines and forage harvesters
26.02.03	ability to select and use tools and equipment
26.02.04	ability to remove and disassemble components
26.02.05	ability to repair and replace damaged components such as pick-up fingers, belts and bearings
26.02.06	ability to heat and bend metals back into shape
26.02.07	ability to prepare and weld components
26.02.08	ability to assemble, install and adjust components

Sub-task

26.03 Repairs processing equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

26.03.01	knowledge of the basic operations of processing equipment and operating systems
26.03.02	knowledge of types of processing equipment such as combines, bale processors and mixers
26.03.03	ability to select and use tools and equipment

26.03.04	ability to remove and disassemble components
26.03.05	ability to replace damaged components such as belts and bearings
26.03.06	ability to replace common wear items such as heat-treated knives and rasp bars
26.03.07	ability to heat and bend metals back into shape
26.03.08	ability to prepare and weld components
26.03.09	ability to assemble, install and adjust components

Sub-task

26.04 Repairs delivery equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

26.04.01	knowledge of the basic operations of delivery equipment and operating systems
26.04.02	knowledge of types of delivery equipment such as manure spreaders, silage wagons and grain carts
26.04.03	ability to select and use tools and equipment
26.04.04	ability to remove and disassemble components
26.04.05	ability to replace damaged components such as belts and bearings
26.04.06	ability to heat and bend metals back into shape
26.04.07	ability to prepare and weld components
26.04.08	ability to assemble, install and adjust components

Task 27

Diagnoses application and irrigation equipment.

Context

Application and irrigation equipment applies product to help produce greater crop yield.

Agricultural equipment technicians diagnose application and irrigation equipment to identify failures and faults.

Sub-task**27.01** Diagnoses spraying equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

27.01.01	knowledge of the theory and operation of sprayers
27.01.02	knowledge of sprayer supporting systems such as pumps, agitation systems, chemical management systems and flow rating systems
27.01.03	knowledge of types of spraying equipment such as pull-type and self-propelled
27.01.04	knowledge of precision agricultural equipment such as for mapping, rate and guidance
27.01.05	knowledge of common defects of spraying equipment such as plugged strainers and nozzles
27.01.06	knowledge of type and size of sprayer nozzles
27.01.07	knowledge of chemical properties of pesticides, herbicides and fungicides
27.01.08	knowledge of hazards associated with working with spraying equipment
27.01.09	ability to select and use diagnostic tools and equipment
27.01.10	ability to calculate flow, volume, distance, speed and pressure

Sub-task**27.02** Diagnoses granular application equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

27.02.01	knowledge of the theory and operations of granular application equipment
27.02.02	knowledge of granular application equipment operating systems such as agitation systems, rating systems and delivery chain systems
27.02.03	knowledge of types of granular application equipment such as pull-type, self-propelled and hitch mounted
27.02.04	knowledge of precision agricultural equipment such as for mapping, rate and guidance

27.02.05	knowledge of common defects of granular application equipment such as worn chains, and shaft and bearing failures
27.02.06	knowledge of hazards associated with working with granular application equipment
27.02.07	ability to select and use diagnostic tools and equipment
27.02.08	ability to perform sensory inspections
27.02.09	ability to calculate volume, distance, weight and speed
27.02.10	ability to calibrate application rate

Sub-task

27.03 Diagnoses irrigation equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

27.03.01	knowledge of the theory and operations of irrigation equipment
27.03.02	knowledge of irrigation equipment operating components such as pumps, reels and piping
27.03.03	knowledge of types of irrigation equipment
27.03.04	knowledge of common defects of irrigation equipment such as plugged strainers and damaged pumps
27.03.05	knowledge of types of irrigation nozzles
27.03.06	ability to select and use diagnostic tools and equipment
27.03.07	ability to perform sensory inspections
27.03.08	ability to calculate rate, volume, speed and pressure
27.03.09	ability to calibrate application rate

Task 28

Adjusts application and irrigation equipment.

Context

Agricultural equipment technicians adjust application and irrigation equipment to optimize performance.

Sub-task**28.01****Adjusts spraying equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

28.01.01	knowledge of the theory and operations of spraying equipment
28.01.02	knowledge of spraying equipment supporting systems such as pumps, agitation systems, chemical management systems and flow rating systems
28.01.03	knowledge of types of spraying equipment such as pull-type and self-propelled
28.01.04	knowledge of precision agricultural equipment such as for mapping, rate and guidance
28.01.05	knowledge of type and size of sprayer nozzles
28.01.06	knowledge of chemicals such as pesticides, herbicides and fungicides
28.01.07	knowledge of hazards associated with working with spraying equipment
28.01.08	ability to select and use tools and equipment
28.01.09	ability to set equipment according to specifications and conditions
28.01.10	ability to adjust rate controller for volume, distance, speed, pressure and flow to compensate for over or under application

Sub-task**28.02****Adjusts granular application equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

28.02.01	knowledge of the theory and operations of granular application equipment
28.02.02	knowledge of granular application equipment operating systems such as agitation systems, rating systems and delivery chain systems
28.02.03	knowledge of types of granular application equipment such as pull-type, self-propelled and hitch mounted
28.02.04	knowledge of precision agricultural equipment such as for mapping, rate and guidance

28.02.05	knowledge of hazards associated with working with granular application equipment
28.02.06	ability to select and use tools and equipment
28.02.07	ability to set equipment according to specifications and conditions
28.02.08	ability to adjust rate controller for volume, distance, weight and speed to compensate for over or under application

Sub-task

28.03 Adjusts irrigation equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	no	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

28.03.01	knowledge of the theory and operations of irrigation equipment
28.03.02	knowledge of irrigation equipment operating components such as pumps, reels and piping
28.03.03	knowledge of types of irrigation equipment
28.03.04	knowledge of types of irrigation nozzles
28.03.05	ability to select and use tools and equipment
28.03.06	ability to set equipment according to specifications and conditions
28.03.07	ability to adjust rate controller for volume, speed, pressure and rate

Task 29

Repairs application and irrigation equipment.

Context

Agricultural equipment technicians repair defective application and irrigation system components. They must be aware of potential hazards associated with chemicals and organic waste processed with this equipment.

Sub-task

29.01 Repair, spraying equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

29.01.01	knowledge of the theory and operations of spraying equipment
29.01.02	knowledge of spraying equipment supporting systems such as pumps, agitation systems, chemical management systems and flow rating systems
29.01.03	knowledge of types of spraying equipment such as pull-type and self-propelled
29.01.04	knowledge of precision agricultural equipment such as for mapping, rate and guidance
29.01.05	knowledge of type and size of sprayer nozzles
29.01.06	knowledge of chemicals such as pesticides, herbicides and fungicides
29.01.07	knowledge of hazards associated with working with spraying equipment
29.01.08	ability to decontaminate sprayers
29.01.09	ability to select and use tools and equipment
29.01.10	ability to set equipment according to specifications and conditions
29.01.11	ability to remove and disassemble components
29.01.12	ability to repair components such as pumps and flowmeters
29.01.13	ability to repair leaks
29.01.14	ability to replace components such as sprayer nozzles and strainers
29.01.15	ability to assemble, install and adjust components

Sub-task

29.02 Repairs granular application equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	yes	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

29.02.01	knowledge of the theory and operations of granular application equipment
29.02.02	knowledge of granular application equipment operating systems such as agitation systems, rating systems and delivery chain systems
29.02.03	knowledge of types of granular application equipment such as pull-type, self-propelled and hitch mounted
29.02.04	knowledge of precision agricultural equipment such as for mapping, rate and guidance
29.02.05	knowledge of hazards associated with working with granular application equipment

29.02.06	ability to select and use tools and equipment
29.02.07	ability to set equipment according to specifications and conditions
29.02.08	ability to remove and disassemble components
29.02.09	ability to replace components such as shafts, bearings and floor chains
29.02.10	ability to repair components such as spinner motors and tubing
29.02.11	ability to assemble, install and adjust components

Sub-task

29.03 Repairs irrigation equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
NV	yes	no	yes	ND	yes	yes	yes	yes	yes	ND	ND	ND

Supporting Knowledge & Abilities

29.03.01	knowledge of the theory and operations of irrigation equipment
29.03.02	knowledge of irrigation equipment components such as pumps, reels and piping
29.03.03	knowledge of types of irrigation equipment
29.03.04	knowledge of types of irrigation nozzles
29.03.05	ability to select and use tools and equipment
29.03.06	ability to set equipment according to specifications and conditions
29.03.07	ability to remove and disassemble components
29.03.08	ability to replace components such as nozzles, impellers and piping
29.03.09	ability to repair components such as pumps and reel drives
29.03.10	ability to repair leaks
29.03.11	ability to assemble, install and adjust components

APPENDICES



Hand Tools

bushing, bearing and seal driver sets	pliers
chisels	probe lights
crimpers	pry bars
electrical terminal tool kit	punches
files	saws
fin comb	screwdrivers
hammers	socket sets
hone set (flexible cylinder hone)	tire gauges
inspection lights and mirrors	wire strippers
magnetic pick-up tools	wrenches
pick sets	

Power Tools

air die grinder	horizontal bandsaw
air hammers	lighting devices (trouble lights, flood lights)
air ratchets	presses
air wrenches	pressure washer
cut-off saw	sanders
drills	soldering iron/gun
grinder	vacuum cleaner
grinding wheels	

Measuring, Testing and Diagnostic Equipment

air conditioning test gauges	diesel fuel injection nozzle testers
air-conditioning test equipment kits	digital/mechanical pressure test gauges
alternator test stands	dynamometer
antifreeze testers	electronic control circuit diagnostic testers
battery load testers	electronic heat guns
borescope	electronic leak detectors
circuit continuity testers	feeler gauges
compression test kit	flow meter kits (analog or digital)
computer engine analyzers	fuel consumption meter
coolant/battery testers	hole gauges
cylinder liner service tool kit	hydrometer
depth micrometers	
dial calipers	

Measuring, Testing and Diagnostic Equipment (continued)

ignition analyzers	sprayer nozzle tester
infrared temperature sensors	spring compression tester
in-line hydraulic testers	squares
inside/outside micrometers	starting/charging analyzers
laptop computer	stop watches
manometers	straight-edges
multimeters (analog/digital)	tachometer (digital photo/strobe light)
outside calipers	tape measures
plastigage	taper gauges
power shift transmission test kits	telescoping gauge sets
pressure test kits	temperature readers
radiator pressure tester and pressure pumps	timing tools
refrigerant identifiers	torque angle gauge
ring groove wear gauges	torque wrenches
rubber stoppers/leak detector kits	transmission services and adjusting tools
rulers	vacuum pump kits
spark testers	verniers

Shop Equipment

battery chargers	post-lock pullers
belt lacing tools	puller sets and components
C-frame presses	recovery and recycling equipment (fuel, oil, antifreeze)
degreasing and steam cleaning equipment	ring compressors
dowel pullers	ring expanders
drill press	ring groove cleaners
hose crimpers	rivet presses
hydraulic hose assembly equipment	roll bed shop presses
hydraulic pumps	rotary hand pumps
hydraulic rams	service trucks
hydraulic service benches	slide hammers
hydraulic shop presses	starting and charging analysers
lathe	thread repair kits
lube bucket pumps	tube and pipe bending and flaring tools
lubrication and oiling equipment	vices
open throat presses	water pump service tools
painting equipment	work benches
parts washers and brushes	
pin bushing drivers	

Specialty Tools and Equipment

air-conditioning fitting kits (with tees, caps, reducers, elbows, tubes, adapters)	oil evacuators
camshaft service tools	oil transfer units (with or without vacuum pump or filtration unit)
compressor specialty tools	refrigerant evacuation pumps
differential/final drive and axle specialty tools	refrigerant reclaiming and recovery equipment
flushing equipment kits	valve magnetic follower holder kits
hydrostatic drive specialty tools	valve refacers
injection pump service tools	valve reseating tool kits
nitrogen accumulator charging kits	valve seat cutters
nozzle service tools, nozzle pullers	valve seat grinders
	valve spring depressors/compressors

Hoisting, Lifting and Staging Equipment

A-frames	lift trucks
blocking	load positioning sling
engine repair stands with component adapter sets	mobile floor cranes
hoisting equipment	overhead cranes
holding fixtures	service jacks with special adapters
hydraulic jacking system (air and electric)	support stands
hydraulic ram jacks	tractor splitting stands
	wheel and axle lifts

Welding and Cutting Equipment

electric arc welding and cutting equipment (with power supply, welding machine, electrode holder, ground clamps)	plasma cutting (with electrical current and air, hoses, welders)
oxy-acetylene welding/cutting equipment (with cylinders, pressure regulators, welding torch, hoses)	

Personal Protective Equipment and Safety Equipment

aprons	exhaust ventilation
carbon monoxide sensors	eye wash station
coveralls	face shields
dust masks	fall protection system
ear plugs	fire blanket
emergency shower	fire extinguisher

Personal Protective Equipment and Safety Equipment (continued)

first aid kit	respirators
gloves (chemical, welding, latex, nitrile, heavy duty)	safety boots
goggles	safety glasses
guard rails	vehicle lock-out systems (tags and locks)
hard hats	welding curtain
hearing protection	welding personal protective gear
masks	wheel chocks

ballast	the placement of metal or liquid weight on a machine for both traction and lifting to ensure proper weight distribution
base engine	assembled block and head including internal components and gear trains
driveline	the connection between a power source and a driven component
drive train	the mechanically driven components, from the flywheel to the ground, that receives power, torque and speed from the engine to create movement (of the machine)
electrical systems	starting, charging, lighting and accessory circuits without computer control modules
electronic control module (ECM)	the module which controls functions of a machine or implement. Some common ECMs are EPU (electronic processing units), ECUs (electronic control units), VECUs (vehicle electronic control units), and TCMs (Transmission Control Modules)
electronic systems	electrical systems operated via computerized electronic control modules and related sensors and wiring
hay preservative	option for hay processing equipment, specifically balers, that allows the operator to bale product at higher moisture content without spoilage
headers	device, attached and powered by a harvester or traction unit, used to gather crop from field
hydrostatic system	a hydraulic system which uses fluid under pressure to transmit power through tubes or hoses to machine drive components such as wheel or track drives; it provides infinite speed at a finite pressure
implement	a towed piece of machinery controlled from the traction unit
precision agricultural equipment	systems allowing the operator to guide and control machinery, map an area, vary rates and eliminate overlaps or misses; the equipment includes a global positioning system, yield monitors, moisture meters, and guided steering

spark ignition system	a system which controls a small amount of electrical power to create and transmit, through a step-up transformer, a high voltage to a sparking device which in turn begins ignition and distributes it at a specific time
staging equipment	approved stands or mounts used to support equipment so it can be disassembled without damage or personal injury
structural component	a component that supports as well as allows equipment to retain its rigidity
suspension	systems that support the main frame and other components which dampens shock load from the ground and may include cabs, booms, belts, undercarriage, axle and wheel assemblies
undercarriage	track type components required to support the machine and transmit power from the final drive to the ground

APPENDIX C

ACRONYMS

API	American Petroleum Institute
CAN BUS	Controller Area Network Bus
ECM	Electronic Control Modules
EGR	Exhaust Gas Recirculation
GMAW	Gas Metal Arc Welding
GPS	Global Positioning System
LED	Light Emitting Diodes
MIG	Metal-arc Inert Gas
MSDS	Material Safety Data Sheet
OAW	Oxy-acetylene Welding
OEM	Original equipment Manufacturer
PPE	Personal Protective Equipment
ROPS	Roll-over Protective Structure
SAE	Society of Automotive Engineers
TDG	Transport of Dangerous Goods
WHMIS	Workplace Hazardous Materials Information System

APPENDIX D

BLOCK AND TASK WEIGHTING

BLOCK A OCCUPATIONAL SKILLS

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	NV	5	7	6	ND	10	5	5	5	5	ND	ND	ND	6%

Task 1 Handles tools and equipment.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	50	30	38	ND	30	70	40	37	50	ND	ND	ND	43%

Task 2 Organizes work.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	10	30	36	ND	35	10	20	19	20	ND	ND	ND	23%

Task 3 Performs routine trade activities.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	40	40	26	ND	35	20	40	44	30	ND	ND	ND	34%

BLOCK B ENGINES AND ENGINE SUPPORT SYSTEMS

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	NV	15	15	15	ND	15	15	14	18	14	ND	ND	ND	15%

Task 4 Performs engine diagnostics.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	60	50	58	ND	60	60	60	51	50	ND	ND	ND	56%

Task 5 Repairs engine and engine support systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	40	50	42	ND	40	40	40	49	50	ND	ND	ND	44%

BLOCK C DRIVE TRAIN

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	NV	15	15	13	ND	10	15	10	14	13	ND	ND	ND	13%

Task 6 Diagnoses drive train.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	60	50	53	ND	60	60	50	50	50	ND	ND	ND	54%

Task 7 Repairs drive train.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	40	50	47	ND	40	40	50	50	50	ND	ND	ND	46%

BLOCK D HYDRAULIC, HYDROSTATIC AND PNEUMATIC SYSTEMS

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	NV	17	20	16	ND	15	20	19	18	20	ND	ND	ND	18%

Task 8 Diagnoses hydraulic, hydrostatic and pneumatic systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	60	50	55	ND	60	75	60	53	65	ND	ND	ND	60%

Task 9 Repairs hydraulic, hydrostatic and pneumatic systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	40	50	45	ND	40	25	40	47	35	ND	ND	ND	40%

BLOCK E ELECTRICAL AND ELECTRONIC SYSTEMS

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	NV	20	20	18	ND	20	20	22	18	16	ND	ND	ND	19%

Task 10 Diagnoses electrical power and control/monitoring systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	60	60	55	ND	75	80	65	62	70	ND	ND	ND	66%

Task 11 Repairs electrical power and control/monitoring systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	40	40	45	ND	25	20	35	38	30	ND	ND	ND	34%

BLOCK F STEERING, SUSPENSION AND BRAKES

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	NV	9	8	10	ND	15	10	5	10	10	ND	ND	ND	10%

Task 12 Diagnoses steering and brake systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	35	30	33	ND	35	40	30	33	30	ND	ND	ND	33%

Task 13 Repairs steering and brake systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	30	30	30	ND	30	10	30	32	30	ND	ND	ND	28%

Task 14 Diagnoses suspension components.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	20	20	21	ND	20	40	20	19	20	ND	ND	ND	23%

Task 15 Repairs suspension components.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	15	20	16	ND	15	10	20	16	20	ND	ND	ND	16%

BLOCK G STRUCTURAL COMPONENTS AND OPERATOR STATION

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	NV	7	5	7	ND	10	5	5	5	5	ND	ND	ND	6%

Task 16 Diagnoses structural components.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	20	25	28	ND	15	10	20	18	20	ND	ND	ND	20%

Task 17 Repairs structural components.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	15	25	21	ND	15	10	10	16	20	ND	ND	ND	16%

Task 18 Diagnoses climate control systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	35	25	28	ND	40	50	40	35	30	ND	ND	ND	35%

Task 19 Repairs climate control systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	30	25	23	ND	30	30	30	31	30	ND	ND	ND	29%

BLOCK H AGRICULTURAL EQUIPMENT

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	NV	12	10	15	ND	5	10	20	12	17	ND	ND	ND	13%

Task 20 Prepares agricultural equipment.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	5	10	10	ND	10	5	3	13	8	ND	ND	ND	8%

Task 21 Diagnoses land preparation tools, tillage implements and seeding/planting implements.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	15	5	10	ND	15	15	11	7	11	ND	ND	ND	11%

Task 22 Adjusts land preparation tools, tillage implements and seeding/planting implements.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	12	5	10	ND	10	10	8	9	10	ND	ND	ND	9%

Task 23 Repairs land preparation tools, tillage implements and seeding/planting implements.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	8	5	10	ND	5	5	6	6	11	ND	ND	ND	7%

Task 24 Diagnoses harvesting, forage and hay equipment.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	14	15	10	ND	15	15	19	20	14	ND	ND	ND	15%

Task 25 Adjusts harvesting, forage and hay equipment.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	11	15	10	ND	10	20	16	17	14	ND	ND	ND	14%

Task 26 Repairs harvesting, forage and hay equipment.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	7	15	10	ND	10	10	10	15	12	ND	ND	ND	11%

Task 27 Diagnoses application and irrigation equipment.

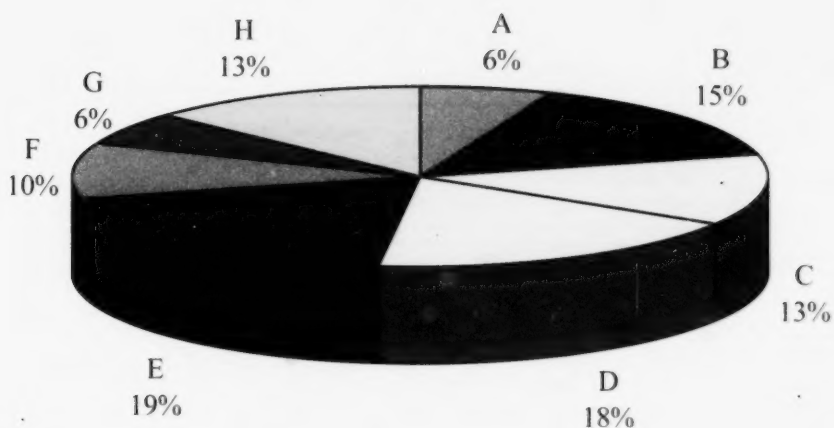
	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	13	15	10	ND	10	10	15	5	8	ND	ND	ND	11%

Task 28 Adjusts application and irrigation equipment.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	9	10	10	ND	10	5	7	4	6	ND	ND	ND	8%

Task 29 Repairs application and irrigation equipment.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	NV	6	5	10	ND	5	5	5	4	6	ND	ND	ND	6%



TITLES OF BLOCKS

BLOCK A	Occupational Skills	BLOCK E	Electrical and Electronic Systems
BLOCK B	Engines and Engine Support Systems	BLOCK F	Steering, Suspension and Brakes
BLOCK C	Drive Train	BLOCK G	Structural Components and Operator Station
BLOCK D	Hydraulic, Hydrostatic and Pneumatic Systems	BLOCK H	Agricultural Equipment

* Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from 100 to 150 multiple-choice questions.

APPENDIX F

TASK PROFILE CHART — Agricultural Equipment Technician

BLOCKS		TASKS	SUB-TASKS				
A	OCCUPATIONAL SKILLS	1. Handles tools and equipment.	1.01 Maintains hand tools.	1.02 Maintains power tools.	1.03 Maintains measuring, testing and diagnostic equipment.	1.04 Maintains welding, heating and cutting equipment.	1.05 Maintains personal protective equipment (PPE) and safety equipment.
			1.06 Uses staging equipment.	1.07 Uses hoisting, lifting and securing equipment.	1.08 Uses computers for diagnostics and programming.		
		2. Organizes work.	2.01 Uses documentation and reference material.	2.02 Communicates with others.	2.03 Plans daily tasks.		
		3. Performs routine trade activities.	3.01 Maintains safe work environment.	3.02 Conducts operational tests.	3.03 Maintains fluids, lubricants and coolants.	3.04 Services filters.	3.05 Maintains hoses, tubing and fittings.
			3.06 Services bearings/bushings and seals.	3.07 Uses fasteners, sealing devices, adhesives and gaskets.	3.08 Cleans components.	3.09 Verifies equipment repairs.	
B	ENGINES AND ENGINE SUPPORT SYSTEMS	4. Performs engine diagnostics.	4.01 Diagnoses base engine.	4.02 Diagnoses lubrication system.	4.03 Diagnoses cooling system.	4.04 Diagnoses intake/exhaust system.	4.05 Diagnoses fuel delivery system.
			4.06 Diagnoses engine management systems.				
		5. Repairs engine and engine support systems.	5.01 Repairs base engine.	5.02 Repairs lubrication system.	5.03 Repairs cooling system.	5.04 Repairs intake/exhaust system.	5.05 Repairs fuel delivery system.
			5.06 Repairs engine management systems.				

BLOCKS		TASKS	SUB-TASKS			
C	DRIVE TRAIN	6. Diagnoses drive train.	6.01 Diagnoses clutches.	6.02 Diagnoses driveline systems and components.	6.03 Diagnoses transmissions and gear boxes.	6.04 Diagnoses differentials.
		7. Repairs drive train.	7.01 Repairs clutches.	7.02 Repairs driveline systems and components.	7.03 Repairs transmissions and gear boxes.	7.04 Repairs differentials.
D	HYDRAULIC, HYDROSTATIC AND PNEUMATIC SYSTEMS	8. Diagnoses hydraulic, hydrostatic and pneumatic systems.	8.01 Diagnoses hydraulic systems.	8.02 Diagnoses hydrostatic systems.	8.03 Diagnoses pneumatic systems.	
		9. Repairs hydraulic, hydrostatic and pneumatic systems.	9.01 Repairs hydraulic systems.	9.02 Repairs hydrostatic systems.	9.03 Repairs pneumatic systems.	
E	ELECTRICAL AND ELECTRONIC SYSTEMS	10. Diagnoses electrical power and control/monitoring systems.	10.01 Diagnoses electrical and electronic components and accessories.	10.02 Diagnoses spark ignition.		
		11. Repairs electrical power and control/monitoring systems.	11.01 Repairs electrical and electronic components and accessories.	11.02 Repairs spark ignition.		
F	STEERING, SUSPENSION AND BRAKES	12. Diagnoses steering and brake systems.	12.01 Diagnoses steering systems.	12.02 Diagnoses brake systems.		
		13. Repairs steering and brake systems.	13.01 Repairs steering systems.	13.02 Repairs brake systems.		
		14. Diagnoses suspension components.	14.01 Diagnoses wheels/tracks and undercarriage.	14.02 Diagnoses cushioning devices.		
		15. Repairs suspension components.	15.01 Repairs wheels/tracks and undercarriage.	15.02 Repairs cushioning devices.		

BLOCKS		TASKS	SUB-TASKS			
G	STRUCTURAL COMPONENTS AND OPERATOR STATION	16. Diagnoses structural components.	16.01 Diagnoses frame components.	16.02 Verifies condition of roll-over protective structure (ROPS).	16.03 Diagnoses equipment body.	
		17. Repairs structural components.	17.01 Repairs frame components.	17.02 Replaces ROPS.	17.03 Repairs equipment body.	
		18. Diagnoses climate control systems.	18.01 Diagnoses heating and ventilation systems.	18.02 Diagnoses air conditioning systems.		
		19. Repairs climate control systems.	19.01 Repairs heating and ventilation systems.	19.02 Repairs air conditioning systems.		
H	AGRICULTURAL EQUIPMENT	20. Prepares agricultural equipment.	20.01 Assembles agricultural equipment.	20.02 Installs agricultural equipment.	20.03 Performs pre-delivery adjustments on agricultural equipment.	
		21. Diagnoses land preparation tools, tillage implements and seeding/planting implements.	21.01 Diagnoses land preparation tools.	21.02 Diagnoses tillage implements.	21.03 Diagnoses seeding and planting implements.	
		22. Adjusts land preparation tools, tillage implements and seeding/planting implements.	22.01 Adjusts land preparation tools.	22.02 Adjusts tillage implements.	22.03 Adjusts seeding and planting implements.	
		23. Repairs land preparation tools, tillage implements and seeding/planting implements.	23.01 Repairs land preparation implements.	23.02 Repairs tillage implements.	23.03 Repairs seeding and planting implements.	
		24. Diagnoses harvesting, forage and hay equipment.	24.01 Diagnoses cutting and conditioning equipment.	24.02 Diagnoses gathering equipment.	24.03 Diagnoses processing equipment.	24.04 Diagnoses delivery equipment.
		25. Adjusts harvesting, forage and hay equipment.	25.01 Adjusts cutting and conditioning equipment.	25.02 Adjusts gathering equipment.	25.03 Adjusts processing equipment.	25.04 Adjusts delivery equipment.

BLOCKS**TASKS****SUB-TASKS**

26. Repairs
harvesting, forage
and hay
equipment.

26.01 Repairs
cutting and
conditioning
equipment.

26.02 Repairs
gathering
equipment.

26.03 Repairs
processing
equipment.

26.04 Repairs
delivery
equipment.

27. Diagnoses
application and
irrigation
equipment.

27.01 Diagnoses
spraying
equipment.

27.02 Diagnoses
granular
application
equipment.

27.03 Diagnoses
irrigation
equipment.

28. Adjusts
application and
irrigation
equipment.

28.01 Adjusts
spraying
equipment.

28.02 Adjusts
granular
application
equipment.

28.03 Adjusts
irrigation
equipment.

29. Repairs
application and
irrigation
equipment.

29.01 Repairs
spraying
equipment.

29.02 Repairs
granular
application
equipment.

29.03 Repairs
irrigation
equipment.

